DOMINION EXPERIMENTAL FARMS

A GUIDE

TO

THE EXPERIMENTAL FARMS

AND

STATIONS

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AND
STATIONS

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NOTE.

Read and keep this Guide Book. You will find these notes prepared by the different Divisional Officers and Superintendents useful both to-day and in the future.

Our Officers are at your service. Visit them or write to them. They may be able to help you solve some of your problems or overcome some of your difficulties.

No postage is required on letters or parcels (not exceeding 5 lbs. in weight) mailed in Canada and addressed to the Director or to any of the chief officers, Central Experimental Farm, Ottawa.

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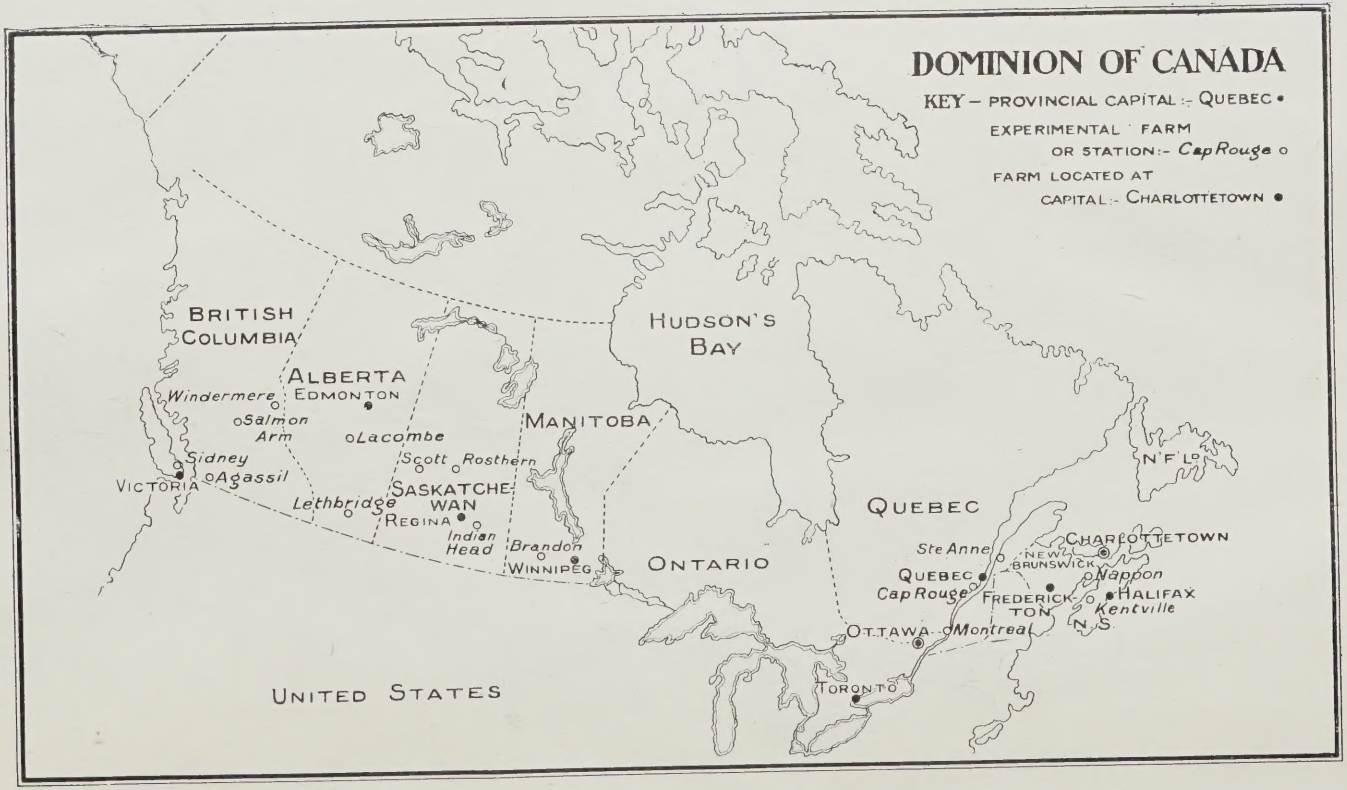

DOMINION OF CANADA
KEY – PROVINCIAL CAPITAL :- QUEBEC •
EXPERIMENTAL FARM OR STATION :- Cap Rouge o
FARM LOCATED AT CAPITAL :- CHARLOTTETOWN •
BRITISH COLUMBIA
ALBERTA
EDMONTON
Windermere
Salmon Arm
Lacombe
MANITOBA
HUDSON'S BAY
Scott
Rosthern
Sidney
Agassil
VICTORIA
Lethbridge
SASKATCHE WAN
REGINA
Indian Head
Brandon
WINNIPEG
ONTARIO
QUEBEC
N'F'LD
Ste Anne
CHARLOTTETOWN
NEW BRUNSWICK
Nappon
QUEBEC
Cap Rouge
FREDERICK TON
HALIFAX
Kentville
N.S.
OTTAWA
Montreal
TORONTO
UNITED STATES

Looking across the Lawns, Central Farm, Ottawa.

LIST OF PAST AND PRESENT DIRECTORS, CHIEF OFFICERS OF DIVISIONS AND SUPERINTENDENTS OF BRANCH FARMS AND STATIONS.

DIRECTORS—	
Wm. Saunders, C.M.G., LL.D	1886–1911
J. H. Grisdale, B. Agr	1911
ASSISTANT DIRECTOR—	
Frank T. Shutt, M.A	1912
AGRICULTURISTS—	
(Acting) Wm. Saunders, C.M.G., L.L.D	1887–1890
Jas. W. Robertson, L.L.D	1890–1896
(Acting) Wm. Saunders, C.M.G., L.L.D	1897–1898
J. H. Grisdale, B. Agr	1899–1911
(Acting) J. H. Grisdale, B. Agr	1911–1912
AGROSTOLOGIST—	
M. O. Malte, Ph D	1912
ANIMAL HUSBANDMAN—	
E. S. Archibald, B.A., B.S.A	1912
FIELD HUSBANDMAN	
(Acting) J. H. Grisdale, B. Agr	1912
O. C. White, B.S.A., (Assistant)	1912
HORTICULTURISTS—	
W. W. Hilborn	1887–1889
John Craig	1890–1897
W. T. Macoun	1898
CEREALISTS—	
(Acting) Wm. Saunders, C.M.G., L.L.D	1887–1902
C. E. Saunders, Ph.D., (termed Experimentalist, 1903–1904)	1903
CHEMIST—	
Frank T. Shutt, M.A, F.I.C	1887
A. T. Charron, M.A. (First Assistant)	1898
ENTOMOLOGIST AND BOTANIST—	
Jas. Fletcher, L.L.D	1887–1908
ENTOMOLOGIST—	
C. G. Hewitt, D. Sc	1909
Arthur Gibson (Chief Assistant)	1899
BOTANIST—	
H. T. Güssow	1909
J. W. Eastham, B. Sc., (Chief Assistant)	1911

POULTRY MANAGER—

A. G. Gilbert	1888
V. Fortier (Assistant)	1903

FARM FOREMEN—

John Fixter	1887–1906
D. D. Gray	1906

SUPERINTENDENTS OF BRANCH FARMS AND STATIONS—

Experimental Station, Charlottetown, P.E.I.—

J. A. Clark, B.S.A	1909

Experimental Farm, Nappan, N.S.—

Wm. M. Blair	1887–1896
Geo. W. Forrest	1896–1897
R. Robertson	1898

Experimental Station, Kentville, N.S.—

W. Saxby Blair	1912

Experimental Station, Ste. Anne de la Pocatière, Que.—Joseph Begin | 1912

Experimental Station, Cap Rouge, Que.—

G. A. Langelier	1911

Experimental Farm, Brandon, Man.—

S. A. Bedford	1888–1905
N. Wolverton, B.A	1906–1907
Jas. Murray, B.S.A	1907–1911
W. C. McKillican, B.S.A	1911

Experimental Farm, Indian Head, Sask.—

Angus Mackay	1888

Experimental Station, Rosthern, Sask.—

Wm. A. Munro, B.A., B.S.A	1909

Experimental Station, Scott, Sask.—

R. E. Everest, B.S.A	1911

Experimental Station, Lethbridge, Alta.—

W. H. Fairfield, M.S	1906

Experimental Station, Lacombe, Alta.—

G. H. Hutton, B.S.A	1907

Experimental Farm, Agassiz, B.C.—

Thos. A. Sharpe	1888–1911
P. H. Moore, B.S.A	1911

THE DOMINION EXPERIMENTAL FARM SYSTEM.

The present system of Experimental Farms and Stations dates from 1886, when an Act was passed by the Dominion Parliament authorizing the establishment of a Central Experimental Farm and four branch Farms.

This Act was the result of two years' preliminary investigation by an Agricultural Committee of the House of Commons and of an examination of experimental stations both in Europe and in the United States, carried on by Dr. William Saunders. His observations on the experimental work being conducted in different countries and his recommendations based thereon, were embodied in a Report which he addressed to the then Minister of Agriculture, Sir John Carling. Upon the passing of the measure to establish a system of Experimental Farms in the Dominion, Dr. Saunders was appointed their Director.

PURPOSE OF THE FARM SYSTEM.

The various lines of work may be briefly stated as follows:—

To conduct researches and experiments designed to test the value, for all purposes, of different breeds of stock and their adaptability to the varying climatic and other conditions which prevail in the several provinces.

To examine into scientific and economic questions involved in the production of milk, butter and cheese.

To test the merits, hardiness and adaptability of new or untried varieties of wheat and other cereals, and of all field crops, grasses and forage plants, fruits, vegetables, plants and trees, and disseminate among persons engaged in farming, gardening or fruit-growing upon such conditions as are prescribed by the Minister of Agriculture, samples of such surplus products as are considered to be especially worthy of introduction.

To analyze fertilizers, whether natural or artificial, and conduct experiments with such fertilizers, in order to test their comparative values as applied to crops of various kinds.

To examine into the composition and digestibility of foods for various animals.

To conduct experiments in the planting of trees for timber and for shelter.

To examine into the diseases to which cultivated plants and trees are subject and also into the ravages of destructive insects and ascertain and test the most useful preventatives and remedies to be used in each case.

To conduct any other experiments and researches bearing upon the agricultural industry of Canada which may be approved of by the Minister of Agriculture.

It is thus planned to cover, as thoroughly as possible, all those branches of agriculture which the investigations of the Parliamentary Committee showed to be in need of assistance, through the discovery and application of more scientific methods. The evidence gathered by them appeared to demonstrate that, while there was no lack of fertility in the soil, and while climatic conditions were favourable for the production of abundant crops, defective and wasteful farming was the cause of the agricultural depression then so widely spread.

LOCATION OF ORIGINAL FARMS.

A study of the requirements of the most thickly-settled agricultural areas of the Dominion led to the location of the five original Farms as follows:—

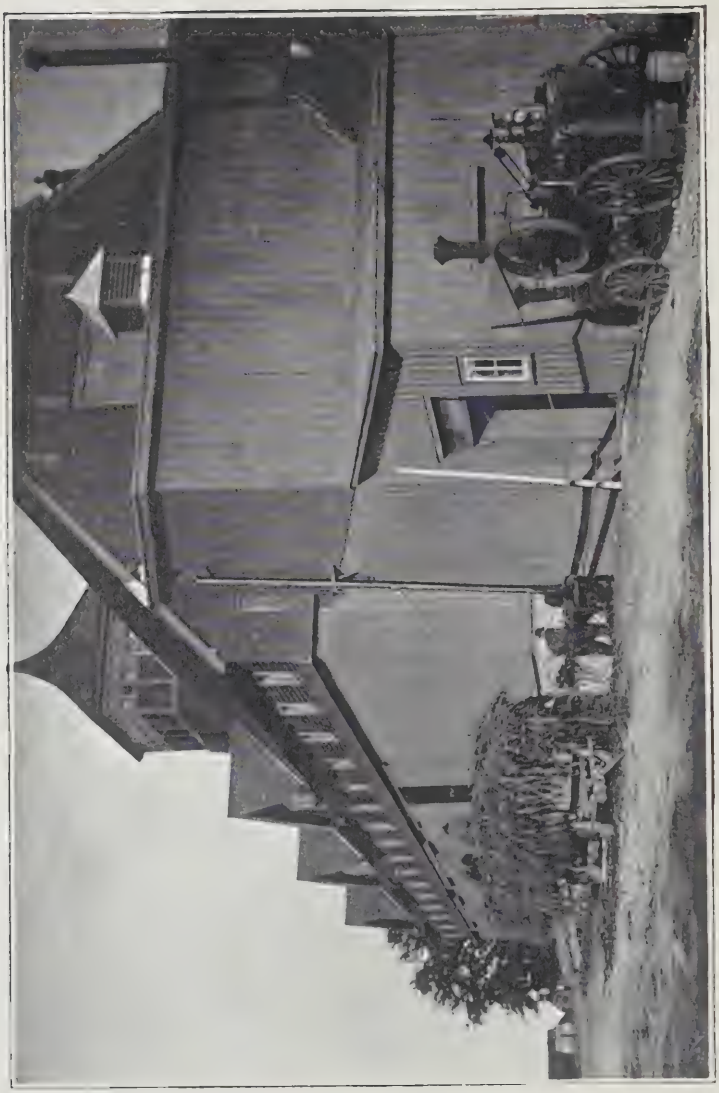
The Central Farm at Ottawa, some 465 acres in area, was designed to serve the requirements of Ontario and Quebec; of the branch Farms, the one located at Nappan, N.S., near the boundary of New Brunswick, was intended to meet the needs of the Maritime Provinces; the Farm for Manitoba was placed at Brandon in that province, and that for the section then termed the Northwest Territories was established at Indian Head, Sask. The Experimental Farm for British Columbia was located at Agassiz.

In the choice of a site for a farm of this character, many points are to be considered. The farm should be in a fairly well-populated district, easy of access to the farmers of the locality and, if possible, near a transcontinental line of travel as well. The soil must be fairly representative and the climatic conditions in the immediate neighbourhood similar to those of the district the farm is intended to serve.

Within two years from the passing of the Act, the five farms had been selected, the necessary officers appointed, most of the buildings erected and the Farms put into practical operation along the lines laid down.

THE CENTRAL FARM.

At Ottawa, the Central Farm, as its name implies, in addition to carrying on those extensive varietal and cultural experiments inaugurated at all the Farms, has served as the headquarters of the Director and the technical and administrative staff under



Filling the Silo, Central Farm.

his control. From here the work of the branch Farms is guided and supervised, although the Superintendents of the latter are allowed a free hand to work out the problems peculiar to their districts.

Lines of Work.

The scientific study of agricultural questions along the lines indicated in the Act of 1886 has also been carried on here by officers having charge of the various branches of such work. Their names, and a brief account of the present scope of the work of each, will be found on other pages.

Publications.

The publication and dissemination of the results obtained from the experimental work conducted at all the farms has naturally been one of the most important features. These have been given each year in the annual Report of the Experimental Farms, the first issue appearing in 1887. In addition, whenever the collection of reliable data on a subject of interest to the farmer has warranted it, a bulletin has been issued. Both reports and bulletins are mailed free to applicants.

Correspondence and Meetings.

A yearly-increasing volume of correspondence relating to all branches of agriculture has been carried on both from the Central and the branch Farms. The officers of the former and the Superintendents of the latter have also given out much information by addressing farmers' meetings and lecturing at Short Courses in connection with some of our Agricultural Colleges and Societies.

VALUE AND PURPOSE OF BRANCH FARMS.

During the quarter of a century since their establishment, a period which has seen such rapid settlement and development in this country, especially in the western provinces, the Experimental Farms have increased in number and have enlarged the sphere of the work carried on.

One great cause of this expansion, other than the need of newly-settled districts for some such institution within easy reach, has been the fact that each section of the country opened to the settler has presented new problems, possible of solution only by experimental work carried on in that locality. The increased

Preparing to Build, Kentville, N.S..

complexity and number of the questions studied are also, to a great extent, the result of the educative influence of the Farms themselves and to the greater interest in correct methods of farming which they have helped to arouse among the farmers of Canada. This tendency towards better farming is very clearly seen in the prairie provinces, where the settler, from regarding the soil merely as a mine of fertility to be exhausted in the production of a yearly crop of wheat, is coming to realize that a system of crop rotation or mixed farming, including the keeping of live stock, means the preservation of the crop-producing power of the land, the eradication of weeds and the fair certainty of a yearly revenue. The teaching of this is being given especial emphasis by the Experimental Farm system and much of the testing of varieties done has been with a view of obtaining hardy, early-maturing sorts of cereals, forage plants, vegetables and fruits, to render the application of the lesson practicable. The value of the keeping of live stock in this connection has not been overlooked and much experimental work is being carried on with different breeds of cattle, sheep and swine. Gradually, the live stock and dairying industry is coming into that prominence in the west which formerly it held in the eastern provinces alone.

New Farms.

In response to the popular demand, additional experimental stations have been and are being located as rapidly as possible. Besides those noted in the companion Guide devoted to a brief account of the Branch Farms and Stations, one was acquired, in 1911, at Kentville, N.S., in the celebrated fruit-growing district of the Annapolis Valley. This Station is some 285 acres in extent and is to be devoted mainly to horticultural work, which will be commenced in 1912. Another Station, at Ste. Anne de la Pocatière, Quebec, 126½ acres in area, will be used for general experimental work, serving more particularly the farmers of eastern Quebec. In British Columbia, in addition to the Farm at Agassiz, some 52 acres have been obtained at Invermere, where fruit-growing will be a main feature, and a third Station has been purchased near Sidney, on Vancouver Island.

Sub-Stations.

Along with these, sub-stations are maintained at Fort Vermilion on the Peace River, in Alberta, where excellent results in cereal and vegetable growing have been obtained, and at Kamloops, B.C., where some of the agricultural problems of a semi-arid region are being studied. Some experimental work is also

being attempted at Forts Smith, Resolution and Providence and at Athabaska Landing, to obtain some data as to the northerly limits of our agricultural area.

On his farm at Salmon Arm, B.C., Mr. Thos. A. Sharpe is continuing for the Department of Agriculture, some of that work in the testing of varieties of fruits which he carried on for so many years while Superintendent of the Experimental Farm at Agassiz.

The Director.

From 1886, when preliminary work was begun, until March, 1911, when advancing age and ill-health compelled him to retire, the administration of the Experimental Farms was most ably supervised by Dr. Wm. Saunders. Much of the experimental work with cereals, fruits and trees, in the earlier years especially, was carried on by him personally, in addition to his arduous executive duties.

His successor, Mr. J. H. Grisdale, B. Agr., was appointed Director in April, 1911. At that time he occupied the position of Dominion Agriculturist and is, consequently, well informed both as to the work done in the past and that needed in the future.

New Divisions Formed.

The increasing volume of the work with live stock, field husbandry and forage crop production, has rendered necessary the division of the work heretofore carried on by the Dominion Agriculturist.

Three new Divisions have been formed, that of Forage Plants, of Animal Husbandry and of Field Husbandry.

The Division of Forage Plants, under the supervision of M. O. Malte, Ph.D., Dominion Agrostologist, will have, as its chief aim, the improvement of the quality and yield of our grasses, clovers, alfalfas, roots and other forage crops.

The Dominion Animal Husbandman, E. S. Archibald, B.A., B.S.A., will have charge of the work with live stock.

The Division of Field Husbandry will supervise field crop production, rotation and cultural experiments on all the Experimental Farms. The acting chief of this Division will be J. H. Grisdale, B. Agr., Director, with O. C. White, B.S.A., as Assistant in immediate charge.

THE AGRICULTURIST'S DIVISION.

The work at the Central Experimental Farm under the direction of the Dominion Agriculturist includes field, live stock and dairy husbandry. While the chief object of the work is to obtain by repeated experiments useful data on the seeding, cultivation and harvesting of farm crops, on the breeding, feeding and housing of various classes of live stock and on the conversion of milk into other marketable products, the management of the whole is, as far as possible, conducted for profit, all operations being carried on after the most approved practical methods, and a record of cost in each case, kept.

The live stock consists of four classes of animals, namely, horses, cattle, sheep and swine.

In order to be representative of the many different interests of the agricultural communities served by the Farm, it is necessary in some cases to keep several breeds of each class of stock. This is not conducive to greatest profit, but the functions of an experimental institution such as this make it necessary to supply the demands of numerous divergent claims.

Horses.

These usually number about twenty, and they are kept primarily for work purposes in connection with the various Divisions of the Farm.

No breeding work has as yet been undertaken, but many feeding experiments are from time to time conducted with a view to lowering the cost of the ration, at the same time preserving its efficiency for horses under the strain of hard work. The economy of feeding bran in conjunction with oats has been clearly demonstrated, and clean, well-cured clover hay as a part of the roughage has proved itself worthy of more general use among farmers.

The proper amounts and the best times to feed and water horses have been subjects of considerable investigation.

Much information has been obtained regarding the most desirable methods of feeding roughages and concentrates.

Many of the stock foods so widely advertised throughout the country have been placed under test, usually with unfavourable results.

In addition to the above and other feeding experiments of a similar nature, attention has been given to the problem of horse barn construction and ventilation.

The results of the investigations made are embodied in the building where the animals are now housed.

Feeding Time, Central Farm.

Dairy Cattle

The cattle barns are stocked with animals such as one might find in any of our better-class dairy farms of Eastern Ontario and Quebec. Holsteins, Ayrshires, Guernseys, Jerseys and French-Canadians are under constant test, records being kept of the feeds given and of the milk and butter returned from all producing cows in the stable. We have never been able to prove superiority of one breed over another in all points. Results here, as elsewhere, go to show that there is a great deal more in individuality than in breed, and except that certain breeds are better suited for certain purposes than are others, we should recommend the beginner to search more particularly for a "best' individual than for a "best" breed. Generally speaking, Holsteins and Ayrshires might be classed as good "milk" or "cheese" cows, whereas Guernseys, Jerseys and French-Canadians, because of their relatively high per cent. of butter fat, together with a moderate flow of milk, are more essentially "butter" cows.

As with work horses, so with dairy cows, the problem that confronts every feeder is how to reduce the ration to a minimum of cost and still maintain its productive power. The economy of a feed depends greatly on the prevailing price, but it is only after determining closely their relative merits as milk producers that one can decide the part each should play in the daily ration. The testing of old feeds under new conditions, and in varying combinations, and the trying-out of special dairy cow feeds, such as are being continually placed upon the market, have constituted a part of the work engaged in.

Roughages of various kinds have been fed and compared in value to some standard roughage. Efforts have been made to determine how far some of our more cheaply produced crops, such as mangels or silage, might replace grain. The particular adaptation of alfalfa for dairy cow feeding calls for more work of this nature. Because of its high nutritive content, it is a worthy rival of some of our best grains, but to just what extent it may replace them is yet to be determined.

Owing to the limited area of our farm, it has not been possible to pasture the cows to any very great extent. We have found it expedient to resort to soiling, by which method of feeding more animals can be maintained per given area than when a portion of the land is used for pasture. Numerous soiling crops have been tried, so that now we are able to have them arranged in such succession and in such quantities that the cattle are supplied with good succulent feed throughout the entire summer.

Careful breeding and selection have brought about a gradual improvement both in the appearance and productiveness of our herds. We cannot impress too strongly the profit of keeping

accurate records of the consumption and production of each animal, for, guided by the information so obtained, in 12 years we increased the average yearly returns from our whole herd from $51.22 to $80.27 per cow.

Beef Cattle.

In addition to tests of various feeds, the investigations with beef cattle have for the most part taken the form of steer feeding experiments of the following nature:—

Feeding steers of different ages.

Limited ration *vs.* full ration.

Baby beef (calves full ration *vs.* limited ration, calves light fed).

Horned, tied, *vs.* dehorned, tied.

Horned, tied, *vs.* dehorned, loose.

Crowded *vs.* roomy.

Large lots *vs.* small lots.

Steers of excellent breeding and conformation *vs.* steers of medium breeding and conformation.

From our many years of experience with steers of all descriptions, we have learned, above all others, this important point: a poor individual, poorly fed, practically always gives a loss, a good individual, well fed, will almost surely return a fair profit. There are, of course, many factors affecting the final outcome of a pen of steers, but the more rapid the feeding from birth to block, the wider the margin that may be expected.

Swine.

Swine in large numbers have always been kept. The stock on hand now includes Yorkshires, Berkshires and Tamworths, representatives of which breeds are sold for breeding purposes, to be used in nearly all parts of the Dominion. In the feeding of these we are able to make very profitable use of the skim milk and buttermilk from the dairy.

Experiments and records with a view to obtaining information on the following points have been carried out:

Selection of breeding animals.

Care and feeding of the brood sow and litter.

Care and handling of the stock boar.

Fattening of pigs for market, including investigations into causes of soft pork.

Summer pastures for growing pigs.

Winter and summer housing of swine.

Ventilation of piggeries.

Cow Barn Stalls, Central Farm, Ottawa.

The piggery operations have always proved highly successful financially, and we should never hesitate to recommend the raising of swine, especially on a dairy farm, where dairy bye-products are available.

Sheep.

A limited area for grazing purposes has necessitated our carrying only small flocks of Leicesters and Shropshires. They are being handled as a commercial flock and though our conditions for sheep raising are anything but the best, they have proved themselves a valuable asset to the Farm.

The experimental work has been chiefly with fattening lambs, where corn ensilage has demonstrated itself the equal of roots.

The Dairy.

A small dairy for the care and preparation of the milk for market is operated. In it are installed such appliances as would be needed on a farm where 60 to 70 cows are kept and where butter and cheese are manufactured at home. A power separator and churn, a small cheese vat and a Babcock tester, together with the necessary smaller appliances, make up the equipment.

The greater part of the cream is manufactured into butter and sold to private customers. A portion is utilized for the making of cheeses of various kinds. Several fancy cheeses have been attempted, and, where a good market for such products is assured, their manufacture is likely to materially enhance the dairyman's profit.

Rotations at Ottawa.

On the Central Experimental Farm there are at present 13 different rotations being tried.

In field crops the number of varieties grown, and the varying areas under each make it somewhat difficult to give an adequate idea of the work going on within the limits of a brief article.

The aim in view is to obtain definite results as to the relative values of different rotations with varied cultural methods, these results to serve the farmer as a basis for the management of general farm crops.

The term "rotation of crops" is used to designate a certain sequence, which regularly repeats itself each time the course of crops is run. It really implies, further, that the crops follow each other in such order as to insure to each, supplies of plant food suitable in quantity and character to produce the best returns

from each crop grown. Hence, in arranging a rotation, it is very necessary to have some knowledge of the food requirements, and to know something of the values of the residues, of the different crops included.

Certain forage crops, such as corn, roots, potatoes and hay require an immense amount of food suitable for stem, leaf and root production. This food is known as nitrates and is furnished by clover and other sod turned down, and in well manured land. Other crops, such as cereals, can thrive with a lighter supply of nitrates, but need more phosphates, hence do well after some forage crop has taken up the superabundance of nitrates found after sod. It is evident, therefore, that a good rotation will include (1) meadow or pasture, (2) roots or corn, (3) some cereal crop.

Various combinations of these three classes are possible and our experimental work is to determine (1) the comparative values of rotations as soil improvers and (2) their relative suitability for different lines of farming.

Rotation 'A'.—5 Year.

First Year.—Land ploughed in August, well worked, ribbed in October; seeded next spring to oats, and 10 lbs. clover sown per acre; allowed to grow one year and turned under as fertilizer for corn.

Second Year.—Corn, manure applied in winter or spring, 25 tons per acre; shallow ploughed, corn planted.

Third Year.—Grain, seeded down, 8 lbs. red clover, 2 lbs. alsike, 10 to 12 lbs. timothy per acre.

Fourth Year.—Clover hay, two crops expected.

Fifth Year.—Timothy hay or pasture.

Rotation 'B'.—5 Year.

First Year.—Grain, land ploughed previous autumn. Seeded down 10 lbs. red clover, 2 lbs. alsike, 5 lbs. timothy per acre.

Second Year.—Clover hay, two crops expected, or pasture.

Third Year.—Corn, manured in winter, 20 to 25 tons per acre; spring ploughed.

Fourth Year.—Grain, seeded down, red clover, 10 lbs., alsike 2 lbs. and 5 lbs. timothy per acre. Land fall-ploughed after corn; very shallow furrow.

Fifth Year.—Clover hay, two crops; late fall-ploughed or pasture.

Rotation 'C'.—4 Year.

First Year.—Hoed Crop—manured, barnyard manure 20 tons per acre.

Second Year.—Grain; seeded down 10 lbs. red clover, 2 lbs. alsike, 12 lbs. timothy.
Third Year.—Hay.
Fourth Year.—Hay or pasture.

Rotation 'D'.—3 Year.

First Year.—Roots or corn. Manured 15 tons per acre.
Second Year.—Grain; seeded down 12 lbs. alfalfa, 6 lbs red clover and 6 lbs. timothy.
Third Year.—Hay.

Rotation 'E'.—3 Year.

First Year.—Roots or corn. Manured 15 tons per acre.
Second Year.—Grain; seeded down 12 lbs. alfalfa, 6 lbs. red clover and 6 lbs. timothy.
Third Year.—Pasture—cattle, sheep or swine.

Rotation 'H'.—3 Year.

First Year.—Roots.
Second Year.—Grain, seeded down 12 lbs. alfalfa, 6 lbs. red clover and 6 lbs. timothy; grain cut for soiling.
Third Year.—Pasture, pigs.

Rotation 'N'.—4 Year.

Same as Rotation 'C', but no manure or fertilizer of any kind used.

Rotation 'S'—4 Year.

Shallow ploughing; deep cultivation by means of stiff-tooth cultivator or subsoiler.
First Year.—Roots or corn, plough August, 4 inches deep; manure 15 to 20 tons per acre; work at intervals, ridge up in fall, sow to roots in spring.
Second Year.—Grain, seeded down, 10 lbs. red clover, 12 lbs timothy per acre.
Third Year.—Clover hay.
Fourth Year.—Timothy hay.

Rotation 'P.'—4 Year.

Deep ploughing; plough, August, 7 inches deep; manure 15 to 20 tons per acre; work with cultivator at intervals. Land ploughed late autumn, 7 inches; roots or corn next spring.
Second, third and fourth years. Same as rotation 'S.'

ROTATION 'R.'—3 YEAR.

Same as Rotation 'E,' but all crops cut and used for soiling.

ROTATION 'X'—4 YEAR.

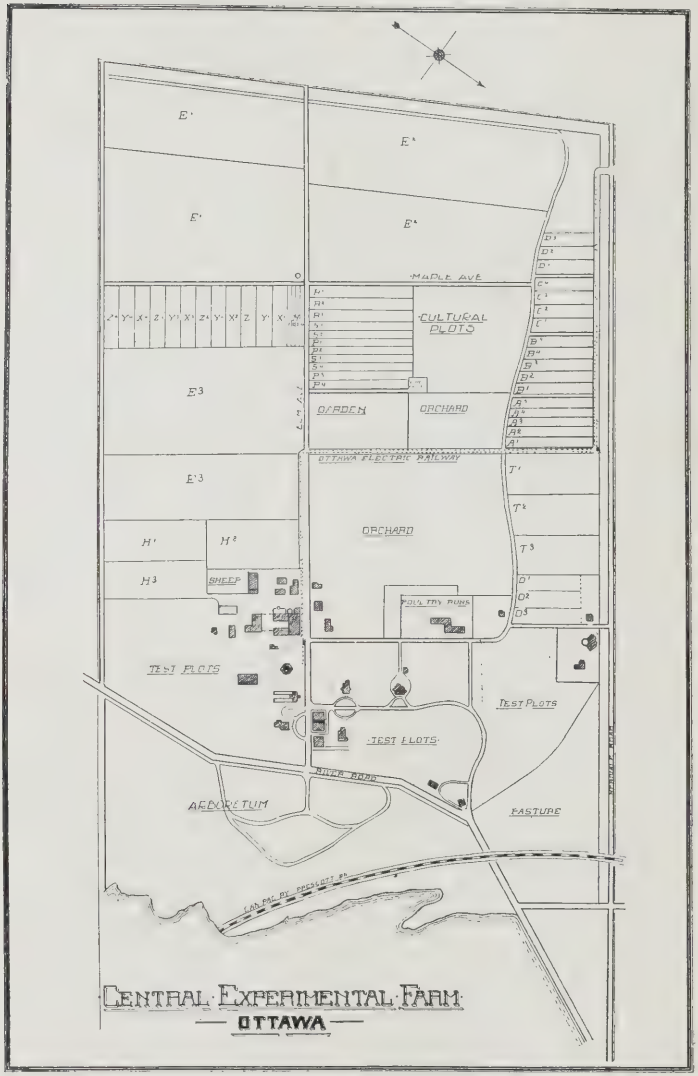
Same as Rotation 'C.' Barnyard manure applied, 15 tons per acre.

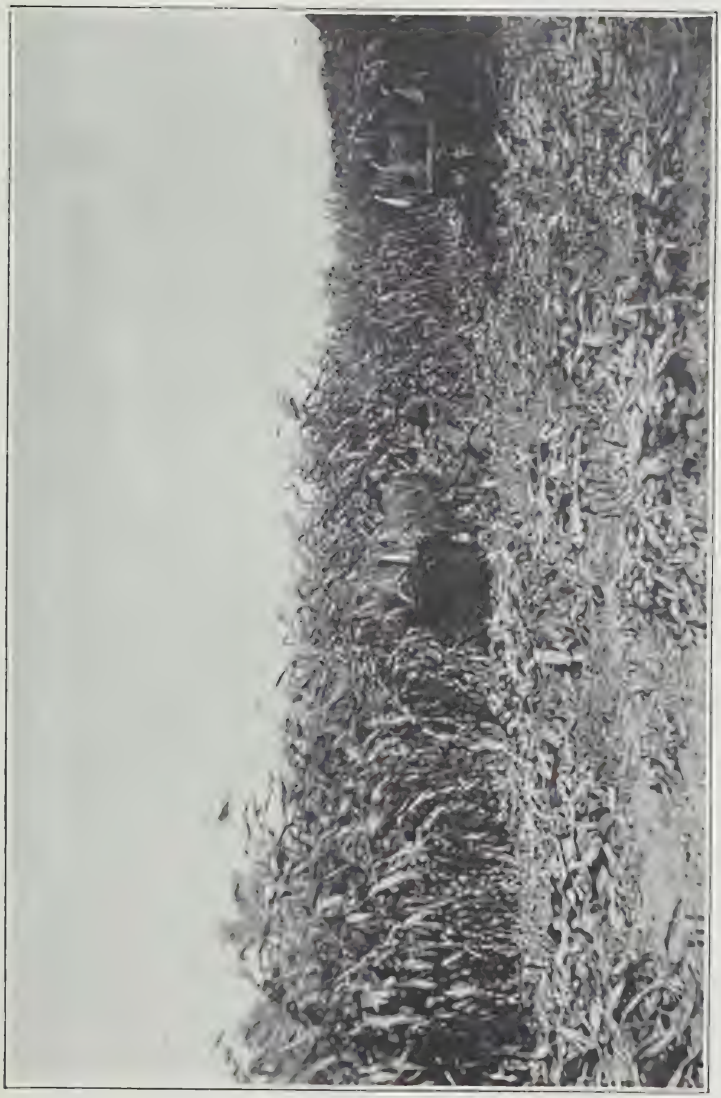
ROTATION 'Y'—4 YEAR.

Same as Rotation 'X,' but no barnyard manure, the same being replaced by commercial fertilizers; 100 lbs. nitrate of soda per acre each spring, with the additional application of 75 lbs. muriate of potash and 300 lbs. superphosphate when in roots or corn.

ROTATION 'Z.'—4 YEAR.

Same as Rotation 'X,' with only half as much barnyard manure but with the same amount of nitrate of soda, half as much muriate of potash ($37\frac{1}{2}$ lbs.) and half as much superphosphate (150 lbs.) as Rotation 'Y.'


MAPLE AVE
CULTURAL PLOTS
GARDEN
ORCHARD
OTTAWA ELECTRIC RAILWAY
ORCHARD
SHEEP
POULTRY RUNS
TEST PLOTS
TEST PLOTS
TEST PLOTS
RIVER ROAD
ARBORETUM
PASTURE
CENTRAL EXPERIMENTAL FARM
OTTAWA



The Corn Harvest, Central Farm, Ottawa.

THE HORTICULTURAL DIVISION.

The original area of land in the Horticultural Division was forty acres, of which approximately one and a half acres have since been given to the Poultry Division. In 1898, the forest belts, comprising about twenty-one acres, were added and, in 1911, the ornamental grounds and nurseries, occupying about 32 acres were included, also an additional seven acres which will be devoted mainly to experiments with vegetables. This makes the total area of land in the Horticultural Division about ninety-nine acres, occupied as follows:—

Fruits and Vegetables: Apples, $23\frac{1}{4}$ acres; Plums, $2\frac{1}{2}$ acres; Cherries, $1\frac{1}{7}$ acres; Grapes, $2\frac{5}{6}$ acres; Raspberries and Blackberries, 1 acre; Currants, $\frac{1}{2}$ acre; Gooseberries, $\frac{1}{3}$ acre; Strawberries, $\frac{1}{2}$ acre; Nursery, 1 acre; Vegetables, 10 acres; Miscellaneous, 3 acres.

Total	46	acres.
Forest Belts	21	"
Ornamental Grounds	30	"
Nursery and Rose Garden	2	"
Total	99	acres.

Fruits.

Apples.—One of the most important lines of experimental work has been the testing of varieties as to their commercial values. Not including those originated at the Experimental Farm, more than 600 different sorts have been tried and those found most suitable for eastern Ontario and the Province of Quebec will be found in the table of best varieties. With this list as his guide, no farmer need plant trees unsuitable for his district.

Seedling Apples.—Much attention has been paid to the growing of seedling apples at the Central Farm, and those who have originated seedlings are invited to send specimens of fruit. When a promising variety is found in this way, scions are asked for, so that it may be tested further. About one hundred seedling varieties of merit have been brought together in this way. Some 5,000 seedlings, from seed produced at the Experimental Farm, have been grown and a large number of very fine varieties obtained, some of which it is thought are better than anything at present on the market among hardy apples. Over fifty of the best have been named and are being propagated so that they may be given a wider test.

Cross-bred Apples.—The work of Dr. Wm. Saunders in

originating hardy apples for the Canadian Northwest is well known. His crosses were mainly between the Berried Crab (*Pyrus baccata*) and the large apples, and about 800 trees were grown, from which some very hardy, though small, apples have come. About 400 trees of second crosses of these, with more blood of the larger apple, are now fruiting, and larger specimens have thus been obtained.

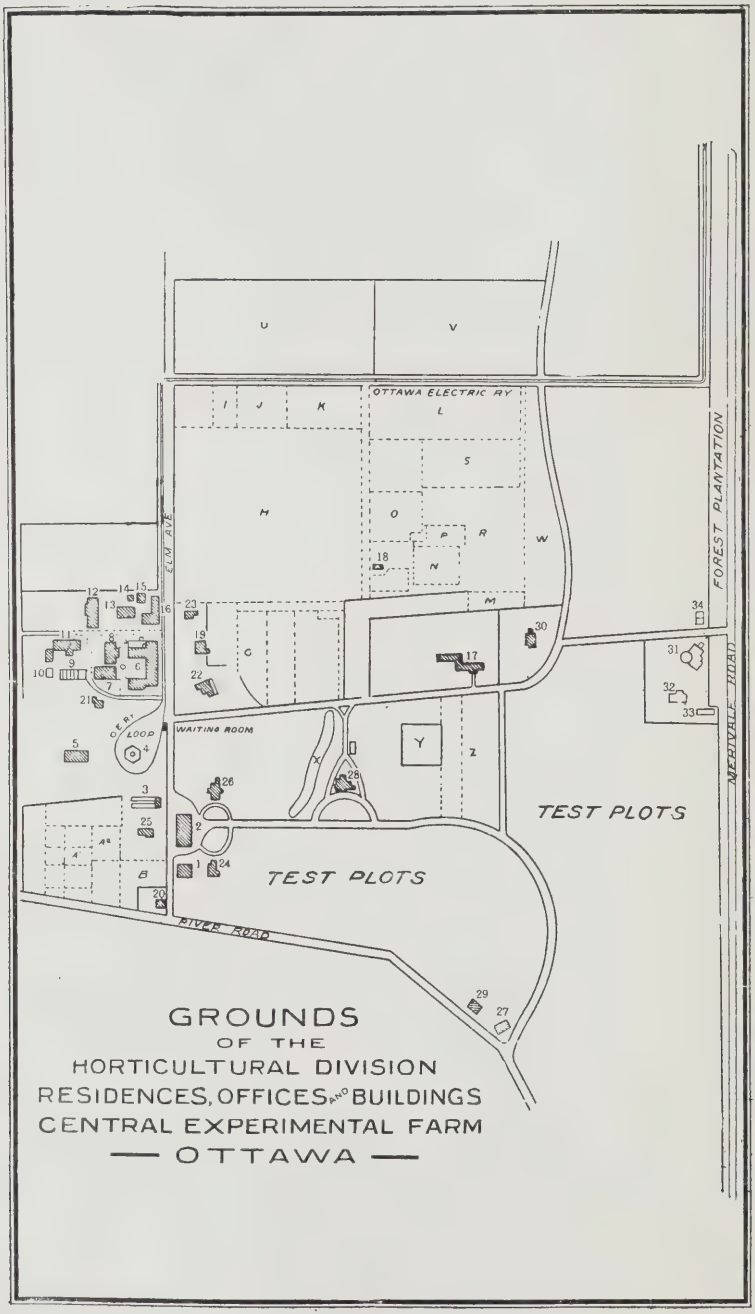
Other crosses between standard varieties have been made by the Dominion Horticulturist with the object of obtaining better hardy varieties, especially for winter use. As a result of this work there are now between 800 and 900 trees, some of which are now fruiting.

Individuality in apple trees.—A record is kept of how much fruit each tree bears at the Central Farm and it has been found that there are marked differences, some yielding about twice as much as others. Propagation of these is being carried on to see if the characteristic fruitfulness will be transmitted.

Cultural Experiments with Apples.—Fall *vs.* Spring planting.—Both fall and spring planting have been tried at Ottawa, the latter method proving the better; this holds true in other parts where the winters are long and severe.

Root-Killing of Apple Trees.—While root-killing of apple trees only occurs at long intervals in most parts of Canada, it is well to guard against it, as fine trees which have reached a bearing age may thus be destroyed in one winter when there is little or no snow; hence, the ground should be covered with something which will hold any snow which there may be. This is called a cover crop. These have received much attention in the Horticultural Division.

Cover Crops.—Cover crops are grown in orchards for the purpose of adding humus to the soil, making it capable of holding more water and also adding plant food to it in some cases. They are also grown with the view of utilizing any plant food not taken up by the fruit trees, thus preventing its leaching. This plant food is returned to the soil the following spring and may be readily used by the fruit trees that season. The cover crop also takes up and transpires a large amount of water. The removal of this from the soil lessens the amount available for the trees, which ripen their wood earlier on this account, ensuring greater safety from winter injury. The seed for cover crops should be sown from the middle of June to the middle of July. Where ripening of wood is more important than conservation of moisture, the early seeding is preferable. Many kinds of cover crops have been grown at Ottawa. Among the best are Red Clover, Summer Vetch, Hairy Vetch, Rape, and Crimson Clover.


OTTAWA ELECTRIC RY
ELM AVE
FOREST PLANTATION
MERIVALE ROAD
WAITING ROOM
CIRC. LOOP
TEST PLOTS
TEST PLOTS
RIVER ROAD
GROUNDS
OF THE
HORTICULTURAL DIVISION
RESIDENCES, OFFICES AND BUILDINGS
CENTRAL EXPERIMENTAL FARM
— OTTAWA —

KEY TO MAP OF HORTICULTURAL DIVISION.

A1Nursery Stock.
A2—Hot Beds.
B—Rose Garden.
C—Vegetables.
D—Strawberry Plantation.
E—Included in area annexed by Poultry Department.
F—
G—Raspberries.
H—Standard Orchard, Seedling and Cross Bred Trees as Fillers.
I—Wealthy Orchard.
J—Seedling Plum Orchard.
K—Seedling Apple Orchard.
L—Vegetables.
M—Cross Bred Apples.
N—Currant Plantation.
O—Raspberries.
P—Nursery Stock.
Q—New Grape Vineyard.
R—Vegetable Plantation.
S—Plum Orchard.
T—Cherry and Pear Orchard.
U—Vegetable Orchard.
V—Russian Apple Orchard.
W—Cross Bred Apples.
X—Perennial Border.
Y—Director's Garden.
Z—Hedges and Experimental Plots of Grasses.

KEY TO BUILDINGS AS NUMBERED ON MAP.

1—Chemical Laboratory.
2—Main Offices.
3—Green-houses.
4—Auditorium.
5—Cerealist's Barn.
6—Main Cattle Barns.
7—Work Shop.
8—Horse Stable.
9—Implement Shed (Pig Runs in Rear.)
10—Experimental Piggery.
11—Piggery.
12—Sheep Building.
13—Root Cellar, Farm Foreman's Office etc.
14—Tobacco Drying House.
15—Tobacco Building.
16—Dairy Building.
17—Poultry Department.
18—Isolation Hopital.
19—Horticultural Building.
20—Cottage.
21—Cottage.
22—Residence Animal Husbandmen.
23—Cottage.
24—Cerealist's Residence.
25—Horticulturist's Residence.
26—Chemist's Residence.
27—Cottage.
28—Director's Residence.
29—Poultry Manager's Residence,
30—Farm Superintendent's Residence.
31—Dominion Observatory.
32—Dominion Astronomer's Residence.
33—Pump House.
34—Biological Building.

Top Grafting Apples.—Ninety varieties of apples, mainly of the more tender sorts, were top-grafted to learn if this would make them sufficiently hardy to withstand very cold winters, but it was found that it did not do so. Top-grafting on bearing trees will bring varieties into bearing earlier, however, than if they are grown as standard trees.

Mice Girdling Apple Trees.—The frequent ravages of mice in orchards are easily prevented and measures to this end should not be neglected. The best way is to wrap the trunks of the trees with ordinary white building paper, putting a little soil about the bottom so that the mice will not get at the trunk of the tree near the ground. If this has been forgotten until after snow falls, tramping the snow about the trees will protect them.

Plums.—Nearly three hundred named varieties of plums have been tried at Ottawa and it has been found that the improved native American sorts are the best, the European and Japanese being too tender in flower bud.

Pears.—Pears do not thrive at Ottawa, though some of the Russian varieties are hardy. The Flemish Beauty appears to be the hardiest good pear.

Cherries.—The flower buds of cherries are usually killed by winter. The list of best varieties gives the hardiest.

Grapes.—Nearly three hundred named varieties of grapes have been tested at Ottawa and more than one hundred have ripened in the same season. The vines must, however, be covered with soil in winter, chiefly to protect them against spring frosts. The canes should not be raised until about the second week in May, or until danger of severe frost is over.

Raspberries.—Raspberries should be bent and held down with soil to secure the best results, as they will be better protected by the snow.

Blackberries.—These are not satisfactory here; the canes are too much injured in winter. Currants, gooseberries and strawberries do well and a large number of varieties of these fruits have been grown.

Varieties of Fruits recommended for Eastern Ontario and the Province of Quebec south of Lat. 46:—

Apples, commercial and domestic: Summer, Transparent, Duchess, Langford Beauty; Autumn—Dudley, Wealthy, Alexander, McMahon; Early Winter—McIntosh, Fameuse, Rochelle, Wolfe River; Winter—Milwaukee, Bethel, Scott Winter.

Additional Varieties suggested for Domestic Use:—

Summer—Lowland Raspberry; Autumn—Peach of Montreal, St. Lawrence; Winter—Swayzie, Pewaukee, Golden Russet, Rufus.

Crab Apples, Commercial and Domestic:—Whitney, Martha, Hyslop.

Cherries, Domestic only—Orel 25, Vladimir, Minnesota Ostheim, Cerise d'Ostheim.

Pears, Commercial and Domestic—Flemish in most favoured parts.

Plums, Commercial and Domestic—*Americana* and *nigra*—Aitkin, Bixby, Mankato, Omaha, Cheney, Wolf, Schley, Brackett, Hawkeye, Stoddard.

Plums, European or *domestica*—Early Red (Russian), Mount Royal, Glass, Montmorency, Raynes, Perdrigon. The European plums bear only in some seasons and are not reliable for commercial purposes.

Grapes, Black—Early Daisy, Manito, Worden, Merrimac, Wilder. Red—Moyer, Brighton, Delaware, Lindley. White—Winchell 9 (Green Mountain), Diamond.

Blackberries, Domestic only—Agawam, Snyder.

Currants, Domestic and Commercial: Black—Saunders, Kerry, Clipper, Eclipse, Climax, Collins' Prolific, Black Victoria. Red—Pomona, Victoria, Dutch, and Wilder in the most favoured parts. White—Grape.

Gooseberries, Commercial and Domestic—Pearl, Downing, Red Jacket.

Raspberries, Black, Domestic purposes mainly—Hilborn, Older, Cumberland. Red—Marlboro, King, Herbert. Cuthbert is rather tender. Yellow, Domestic purposes mainly—Golden Queen.

Strawberries, Commercial—Bederwood (Per.), Splendid (Per.), Warfield (Imp.), not suited to light soil; Greenville (Imp.), Parson's Beauty (Per.), Pocomoke (Per.), Sample (Imp.), Buster (Imp.) Domestic—Excelsior (Per.), Splendid (Per.), Dunlap (Per.), Lovett (Per.), Ruby (Per.), Bubach (Imp.), Belt (Per.)

The Williams does not seem to do as well in Eastern Ontario as in Western.

Vegetables.

Many experiments have been conducted with a large number of varieties of vegetables, among others the determining of the relative values of varieties from the standpoints of earliness, yield and quality. Potatoes, peas and tomatoes have received more attention, perhaps, than others. Many cultural experiments with potatoes have been tried, including kinds of sets to plant, depth of planting and change of seed. Trial shipments of tomatoes have been made to Great Britain.

An especial feature of the work at present is the development of early and, it is hoped, better, strains of vegetables, including peas, corn, beans, melons and tomatoes.

The Vegetable Gardens, Central Farm, Ottawa.

FARMERS' LIST OF BEST VEGETABLES.

Asparagus.—Palmetto, Conover's Colossal, Argenteuil.

Beans, Yellow-podded.—Round Pod Kidney Wax, Ward well's Kidney Wax. Green-podded—Stringless, Early Red Valentine, Early Refugee. Later Sorts—Refugee, Thousand-to-One. Among Lima beans, the dwarf or bush forms are the most satisfactory.

Beets.—Meteor, Early Model, Electric, Egyptian, Eclipse.

Borecole or Kale.—Dwarf Green Curled Scotch.

Brocoli.—White Cape.

Brussels Sprouts.—Improved Dwarf. Dwarf varieties are more satisfactory than tall-growing ones.

Cabbage.—Early Jersey Wakefield (early), Succession (medium), Danish Ballhead and Drumhead Savoy (late), Red Dutch, Houser, Paris Market (extra early.)

Cauliflower.—Early Dwarf Erfurt, Early Snowball.

Carrots.—Chantenay, Early Scarlet Horn (extra early but small.)

Celery.—Golden Self-Blanching (Paris Golden Yellow) (early), French Success, Noll's Magnificent, Perfection Heartwell, Triumph, Winter Queen, all late varieties. London Red.

Corn.—Malakoff, Peep O'Day (extra early), Early Fordhook, Early Cory, Crosby's Early, Golden Bantam, Metropolitan (Second early), Perry's Hybrid, Early Evergreen and Black Mexican (medium), Stowells' Evergreen, Country Gentleman (late). Country Gentleman should not be omitted. Golden Bantam is the best second early for home use.

Cucumbers.—Peerless White Spine or White Spine, Davis Perfect, Cool and Crisp, Giant Pera, Boston Pickling, Chicago Pickling.

Egg Plant.—New York Improved, Long Purple.

Lettuce.—Black-Seeded Simpson, (early curled), Iceberg, New York, Giant Crystal Head, Crisp as Ice, Improved Hansen (curled), Improved Salamander (uncurled). Grand Rapids is the best for forcing. Iceberg remains headed longest. Trianon and Paris are two of the best Cos varieties.

Melons, Musk.—Long Island Beauty and Hackensack are two of the earliest and best of the nutmeg type. Montreal Market is later but of larger size and of finer flavour. Emerald Gem and Paul Rose are two of the best yellow-fleshed.

Melons, Water.—Cole's Early, Salzer's Earliest, Ice Cream, Phinney's Early.

Onions.—Yellow Globe Danvers, Large Red Wethersfield, Australian Brown. Prizetaker for transplanting.

Parsley.—Double Curled.

Peppers.—Cayenne, Chili, Cardinal, Early Neapolitan.

Peas.—Gregory's Surprise, (extra early), Thomas Laxton, Gradus, American Wonder, Nott's Excelsior, Sutton's Early Giant, Sutton's Excelsior, Premium Gem (second early), McLean's Advancer, Heroine, Stratagem, (medium to late). The foregoing may be grown without supports. Telephone and Champion of England are two of the best tall-growing sorts.

Potatoes.—Early.—Rochester Rose, Early Ohio, Irish Cobbler, Eureka Extra Early, Early Petoskey, New Early Standard, Bovee. Main Crop.—Carman No. 1, Gold Coin, Factor, Dalmeny Beauty, Money Maker.

Radishes.—Early.—Scarlet White-Tipped Turnip, Rosy Gem, French Breakfast, Red Rocket, Icicle. Late.—White Strasburg, Long White Vienna. Winter.—Long Black Spanish, Chinese Rose-coloured, New White Chinese or Celestial.

Rhubarb.—Linnaeus, Victoria.

Salsify.—Long White, Sandwich Islands.

Spinach.—Victoria Thickleaved.

Squash.—Early.—White Bush Scalloped, Summer Crookneck. Late.—Delicious, Hubbard.

Tomatoes.—Early.—Sparks' Earliana, Chalk's Early Jewel, Bonny Best, Dominion Day. Medium.—Matchless, Trophy, Livingston's Globe, Plentiful.

Turnips.—Early.—Extra Early Milan, Red Top Strap Leaf.

Swedes.—Champion Purple Top, Skirving's Improved.

Spraying.

Experiments in the spraying of fruits, vegetables and ornamental plants to prevent the ravages of insects and fungous diseases have been an important part of the work of this Division since 1890.

Forestry.

In the forest belts, there are some 20,000 trees. Measurements are taken each year of the growth of a number of specimens of the most important kinds of timber trees, and notes are made of the relative ability of the different species to withstand shade, to compete with other kinds in mixed plantations, to shade the ground to prevent the growth of grass and weeds, and the best distance apart to plant.

Ornamental Grounds.

On the ornamental grounds and in the greenhouse, are grown many species and varieties of trees, shrubs and herbaceous plants. Lists of the most attractive of these have been published. The sample hedges to the number of nearly one hundred are also here where those contemplating hedge planting may compare them as to beauty and usefulness.

Publications.

A number of useful bulletins have been published by the Division and those which are still in print may be obtained free on application.

On another page will be found a map, showing the positions of the various plantations on the area of land devoted to horticultural work.

21294—3½

THE CEREAL DIVISION.

The investigations carried on within this Division may be conveniently considered under five headings, (1) Testing of Varieties, (2) Importation of new Sorts, (3) Selection, (4) Cross-breeding and (5) Distribution.

(1) Testing of Varieties.

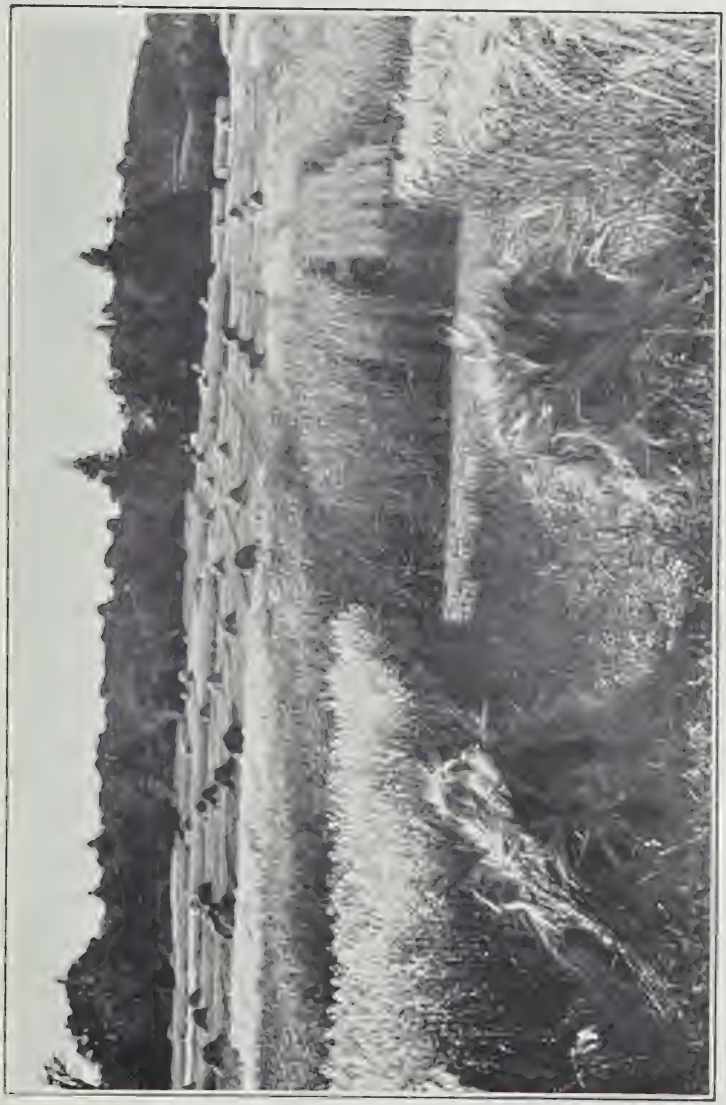
In a series of uniform test plots comparisons are made every year between the best varieties of grain which are commonly grown in Canada, and such sorts as have been recently imported from other countries, as well as the selected strains and new cross-bred varieties produced at this Farm. These plots are usually one-sixtieth of an acre in extent and are laid out in regular blocks with suitable spaces between. The number of plots varies greatly from year to year. New varieties are being constantly added, but an effort is made to keep down the total to a rather small number, by rejecting the inferior sorts as soon as their qualities have been clearly demonstrated. In laying out the plots, great care is taken to locate them on soil of as nearly uniform character as possible and extra plots are sown whenever unusual variations occur. Under the ordinary spring conditions, the plots of grain are put in as early as practicable, commencing about the 20th of April on well-drained land. Each group of plots is sown on one day, if possible, and, when the number of varieties is too large to permit this, the seeding is concluded on the following day or days, as expeditiously as may be. Different dates of seeding produce marked results, in this climate, on the yield of most kinds of grain.

Observations are made, in the plots, on length and strength of straw, time of ripening and any other points of special interest. Yield and quality of grain are determined after threshing.

Since it is impossible, even under the most favourable conditions, to obtain perfectly trustworthy information in one season, in regard to the relative merits of similar varieties, the average results of a series of years are utilized whenever comparisons are being made. In most cases, new varieties are kept in the plots for at least five years, unless they clearly show some serious defect.

(2) Importation of New Sorts.

The introduction from abroad of varieties new to Canada has been in the past a very valuable feature of the cereal investigations, but this has become less important in certain



Cereal Plots at Central Farm.

respects as the work has advanced. In recent years, no promising kinds of spring wheat and scarcely any of six-row barley have been obtained; but of two-row barley and oats some interesting new sorts have been imported which are likely to prove of value in Canada.

While the foreign varieties hitherto tested have very often been found somewhat unsuited to Canadian conditions, several of them have been utilized as parent sorts for cross-breeding purposes and have in this way contributed largely to the progress of the work.

(3) Selection.

While the progress which may be looked for by mere selection has undoubtedly been seriously overestimated in some quarters, it is, nevertheless, a valuable branch of experimental work and one from which good results are being obtained, not only in regard to the general appearance of the crops, but in more important respects also.

As most commercial grains are lacking in uniformity and, sometimes, are strikingly complex mixtures, considerable attention has been paid in the Cereal Division to the selection of the best types from such of the commercial varieties as appeared most valuable.

Among the first sorts operated upon were Red Fife wheat, Mensury barley and Banner oats. From each of these, several good strains were isolated, the best of which were retained and propagated. Two of these deserve special mention. Red Fife H has not only proved of the highest quality, but has shown, in some seasons, a slight advantage in earliness of ripening. After several years' trial at Ottawa and at the branch Experimental Farms, it has been used to supplant the ordinary Red Fife. It has also been widely distributed to farmers by means of the annual distribution of seed grain from Ottawa. From Mensury barley, an improved strain, now named Manchurian, has been isolated. This has given very good results for several years at Ottawa and elsewhere and is now displacing the parent sort, both on the Experimental Farms and in the annual distribution.

The method of selection employed is that which is now generally recognized as the best, and which has been found to give the most satisfactory results whenever fairly tried. At the commencement, a number of plants or heads which appear to be of the most desirable type are chosen. The seed from each of these is sown separately and the groups of plants produced are carefully studied. The best groups are retained, the seed of each being kept separate. Study of this seed may lead to the rejection of some lots. Those that remain are sown

in small plots the following year. Each selected strain is always kept separate and from year to year comparisons are made and those strains which show themselves inferior are eliminated until the whole number is, generally, reduced to one or two, which are sometimes quite different from the parent variety.

A similar system of selection is followed when dealing with the progeny of cross-bred seeds, although in these cases, owing to the inherent tendencies to variation, the selection of single plants has to be repeated every year, for about five times, until the various types become quite fixed in character.

The cross-bred wheats which were originated on the Experimental Farms during the first few years after their establishment, and to which the system of selection then in vogue was applied, have since been re-selected with decidedly beneficial results, by the method here described.

(4) Cross-Breeding.

While good results may be attained in the improvement of grains by selection alone, this method has been found inadequate whenever the necessity has arisen for the production of varieties radically different from those already on hand. Cross-breeding must be resorted to when new combinations of characters are required. Realizing the importance of such work for Canadian conditions, especially in regard to spring wheat, a great deal of attention has been given to it ever since the establishment of the Dominion Experimental Farms. Indeed, it may be said that the most important work of the Cereal Division is in the production of new, cross-bred varieties of spring wheat of early ripening habit and suitable for the northern wheat-growing areas of Canada. Many hundreds of new kinds have been produced, chiefly by crossing Red Fife (and varieties derived from it) with early ripening sorts obtained from India and Northern Russia. A few of these wheats have already been quite widely disseminated and have displayed excellent qualities. Many others are still undergoing selection and preliminary trial at Ottawa. Of the varieties which have proved useful in districts where the older standard wheats could not be depended upon to ripen before frost, the most noteworthy is Marquis. This wheat comes from a cross between Hard Red Calcutta and Red Fife. After being tested for a few years at Ottawa, it was sent first to the Experimental Farm at Indian Head, Sask. for trial in the year 1907. From the very beginning it proved remarkably successful in Saskatchewan, and has since been found of great value in parts of Manitoba and Alberta also. Marquis is now recognized as the best early ripening wheat available for the farmers of Saskatchewan.

While Marquis leaves very little to be desired in some districts, it does not ripen early enough in other parts to be safe from danger of frost. Still earlier varieties are therefore required. Many such sorts have been produced at Ottawa during the last few years, and some of them have been tested at other farms as well and have been found to possess most of the qualities desired for those districts where Marquis has not proved sufficiently early. This important branch of work is being advanced as rapidly as possible, and the introduction to the public of one or two very early ripening wheats of high quality may be looked for in the near future.

While, in the cross-breeding of spring wheat, most attention is being given to the needs of the northern districts of Canada, where the summer season is short, the problems of wheat growers in other sections are not being neglected.

Cross-breeding has also been carried on in oats, barley, peas, flax and beans.

Since much attention is paid to the breeding and selection of oats in other countries—especially in England and Sweden—and the varieties produced abroad have generally proved suitable for Canada also, it has not seemed necessary in the Cereal Division, to devote so much time to oats as to spring wheat. Some cross-breeding, however, has been carried on with a view to the production of a satisfactory variety of hulless oat. Efforts have also been made to originate a superior sort of early-maturing oat both by cross-breeding and by selection.

In barley, cross-breeding has been conducted to produce very early maturing varieties with good straw. Beardless (or "hooded") and hulless types have been largely dealt with, and many new sorts of striking and novel character, now quite fixed in type, are under test.

The researches in peas have given rise to some new varieties of considerable promise so far as productiveness is concerned. One of these, an early maturing sort named Arthur, has been distributed with good results.

The work of cross-breeding in flax and in field beans was commenced quite recently, and it would be unprofitable to discuss the results at this time.

(5). Distribution.

The final stages of the work of the Cereal Division are the propagation and the distribution to farmers of new and improved cereals.

The propagation is generally commenced at Ottawa and is transferred to one or more of the branch Farms when a sufficient quantity of seed for the purpose has been obtained. Most of

the seed for distribution is grown on the Experimental Farms at Indian Head, Sask. and Brandon, Man.

An annual distribution of free samples of seed grain is conducted, for the whole of Canada, from the Central Farm. The samples sent out weigh from three to five pounds each, according to the kind of grain, and are sufficient, as a rule, to sow one-twentieth of an acre of land. Three-pound samples of potatoes are also given to farmers as a part of this distribution, but the Central Farm supplies these to the provinces of Ontario and Quebec only. Potatoes for the other provinces are distributed from the branch Experimental Farms.

The whole distribution from Ottawa has amounted to between thirty thousand and forty thousand samples each year for several years past. It is expected, however, that this number will be considerably reduced by certain changes and new regulations which are being introduced with a view to eliminating those classes of applicants who do not make good use of the seed supplied.

The distribution has always been popular and the requests for free samples of the new and most desirable sorts of grain have often been so great that it has been impossible to meet the demand. Undoubtedly much good has been accomplished by this work, although some of the farmers who have received samples have failed to give the necessary care to the propagation of the seed, and have therefore derived little or no benefit from it. Many careful seed-growers, however, have been able to propagate from these small samples with such rapidity as to obtain a large quantity of pure seed at the close of the third season; and, in exceptional cases, two seasons have been sufficient to produce all the seed needed by the farmer for his own use and a surplus for sale as well.

Buildings at Ottawa used by the Cereal Division.

The principal building devoted to the use of the Cereal Division is situated on the sloping ground which leads from the terminus of the street car line down to the southern boundary of the Farm. This building contains a threshing floor, a granary, a writing room, grain cleaning and bagging rooms, and other necessary accommodations for the proper handling and inspection of grain and for the storage of materials and implements.

The grain which is used in the annual distribution is all cleaned, bagged and prepared for mailing in this building. Great care is taken to send out the seed in the finest possible condition, and, with this in view, the best available grain-cleaning machinery has been installed. All the seed intended for distribution is carefully inspected both before and after cleaning and

its germination and weight per bushel ascertained. Any lot of grain which cannot be brought up to the required standard is rejected. The growing appreciation by farmers of the value of good seed makes it imperative to raise the standard of quality in the distribution as high as possible. Improvements in the system of growing, cleaning and inspecting the grain are therefore made from time to time whenever an opportunity occurs for introducing any desirable change.

In this building there is also a milling room where, by means of a small roller-process mill, the flour required for the baking tests is produced.

Power for the threshing machine, the flour mill and the grain cleaning machinery is supplied by an electric motor.

The offices of the Dominion Cerealist and part of his staff are situated in the main office building. Here also is located the baking room where special apparatus, designed by the Cerealist, has been installed for carrying on accurate bread-making experiments to determine the relative value of various wheats for the production of light bread, and for the study of other related problems which are of particular interest to wheat growers, millers and bakers. This work is of such great importance that considerable time has been devoted to it. For various reasons, the baking tests can be conducted most satisfactorily during the winter and they are therefore confined as far as possible to that period. A large proportion of the tests for several years have been carried on with the new cross-bred wheats intended for introduction into the prairie provinces. Since the highest market price is usually paid for those wheats only which are capable of producing very light bread, the necessity for a thorough study of the quality of each variety is apparent, so that only those of desirable character may be distributed.

New sorts of wheat produced at Ottawa and intended for export purposes are always subjected to at least two series of baking tests, in successive seasons, before decisions are reached as to their suitability for general cultivation.

Fields at Ottawa.

Three fields at the Central Farm are allotted to the use of the Cereal Division. These are of about eight to twelve acres each and are designated on the map by the names, North Field, East Field, and South Field. No permanent plan of the internal divisions of these fields can be given, owing to the necessity for constant rotation and shifting of the positions of the plots.

The standard size of trial plot used at this Farm is one-sixtieth of an acre (approximately, 14 x 51 ft.) the grain being sown with a space, equivalent to one row of seed, omitted down

the middle of the plot. The purpose of this is to facilitate passage through the standing crop without causing serious disturbance, as all plots require careful inspection for the elimination of occasional large weeds and also to ensure freedom from undesirable types of grain.

In addition to the test plots of the regular size, smaller and larger plots are used for special purposes. The new cross-bred varieties of grain are grown for several years in very small plots, or groups of plants, each plot being from the seed of one plant of the previous year. These little plots are generally about two feet by three in size. As soon as these varieties have become fixed in character, propagation is commenced. In the first year of propagation, the seed from one plant only is used, and each kernel is put in separately by hand. New, selected strains of standard varieties are also commenced in the same way. This gives a series of little plots measuring about two by five feet, or more. In the second year of propagation, the seed derived from each of these little plots is sown with a hand seed drill. In this way plots are produced which measure usually about fifty feet in length and vary in width from one or two rows to about ten or fifteen. The next season, such of the varieties as have displayed good qualities are transferred to the regular, one-sixtieth acre, plots.

After these tests have been conducted for a sufficient length of time, those varieties which appear most desirable and are therefore required for trial elsewhere or for distribution are grown at Ottawa for one season in larger plots, the size of which varies according to the quantity of seed available. The crop from these larger areas is sent to one or more of the branch Farms where further tests are made and where the best varieties are finally grown, in fields of several acres each, for general distribution.

Chemical Laboratory, Central Farm, Ottawa.

DIVISION OF CHEMISTRY.

The work of the Division of Chemistry naturally and necessarily covers a very wide field. In a certain and very important sense, farming—and especially modern and progressive farming—is the putting into practice of the teaching of agricultural chemistry. Farming, whether general or special, is ever making an insistent call for the knowledge, the aid, which chemistry alone can give, and so the chemist must be constantly at work, analyzing and investigating, ascertaining the why and the wherefore of things agricultural, confirming and supplementing by laboratory work the truths brought out by practical field results.

To understand the requirements of crops and animals is the aim of the intelligent farmer. It thus comes about that soils must be studied to learn their qualities and deficiencies; apart from climatic influences, the productiveness of soils very largely depends upon their physical character and their ability to furnish plant food in available forms. The effect on the soil of the rotation of crops, of the growth of legumes, of continuous grain growing, of fallowing and various cultural systems must be studied from the chemical as well as from the field point of view if we are to know how the land is to be handled most profitably and its fertility maintained.

In like manner, it might be shown that farm manures must be critically studied and analyzed; that the naturally-occurring minerals having a fertilizing value—mucks, marsh and river muds, marls, seaweeds, etc., etc., found in many parts of the Dominion, must be examined as to their agricultural worth; that the special requirements of specific crops must be investigated, that the nutritive qualities of our grasses and forage crops must be determined and the feeding value of the cattle foods upon our market ascertained in order that dairying and stock raising may be profitably prosecuted; that much chemical work is necessary for progress in butter and cheese making and that in fruit growing the chemist's assistance must be enlisted to prepare and control the various insecticides and fungicides now so necessary for the production of first-class fruit. All these and many other related investigations have been studied by the Chemical Division since the establishment of the Experimental Farms in 1887, the results appearing in our annual reports and bulletins, the larger number of which are still available for distribution. At the outset, this work was entrusted to Mr. Frank T. Shutt, M.A., F.I.C., who still continues, with a staff of expert assistants, to direct and carry out these investigations.

There is, therefore, at all times, a multiplicity of problems that the Division is striving to solve. For the purpose of this

outline, some of the more important of these may be spoken of briefly as follows:—

Canadian Soils.

In every province of the Dominion, save that of Prince Edward Island, there yet remain large areas of unoccupied land. It is desirable to learn how far these tracts of virgin soil may be suited to agriculture, and, to supplement the surveyor's reports, typical samples of their soils and sub-soils are collected and examined as to their constitution and composition.

The problem of the economical restoration of fertility of lands which have been irrationally farmed, is one constantly submitted to the Division, and our work upon it is making very clear that humus-forming material must be furnished, in barn-yard manure, in the ploughing under of green crops (preferably a legume), or in the adoption of a rotation which calls for the formation of a sod to be ploughed down at short intervals, if fertility is to be restored. In this connection, our experiments with clover and other leguminous crops have yielded valuable results in showing how a poor soil may be built up by the accumulation of humus-forming material and nitrogen.

The improvement of muck soils has proven a problem of extreme difficulty, the final solution of which we have not as yet reached. While some have yielded to treatment, others have remained, from some unknown cause, obstinate. Nevertheless, the lines upon which improvement are to be sought have been established and, while investigatory work must yet be pushed forward, we have learnt that drainage, the correction of acidity by liming, the furnishing of the lacking phosphoric acid and potash and the initial dressing of manure to supply immediately available plant food and to inoculate the soil with those bacteria which will bring about the further decay of the soil-constituents, are the basic means of bringing about their amelioration.

Conservation of Soil Moisture.

The influence of various cultural systems on the conservation of soil-moisture—a question of the utmost importance to districts subject to a sparse rain-fall—is a matter that is engaging our attention. These experiments are being conducted on the Experimental Farms in Manitoba, Saskatchewan and Southern Alberta.

Cereals.

Under this head, investigations have been carried on for some time past with wheats and flours. Among other objects, it has been thought to establish some chemical basis for determ-

ining the bread-making value of a flour that might accord more closely than is now possible with the results from baking tests.

The influence of soil and climatic conditions on the gluten-content is also being studied. This research is throwing much light on the cause of the high quality of our northwestern grown wheats. It has been found that, by varying the conditions of growth, marked changes in the composition of the grain might be brought about. Thus the harder, more glutinous wheat produced under "dry-farming" conditions will, if sown on land under irrigation, give a softer, starchier grain and *vice versa*. It would appear that the amount of available soil moisture together with the temperature prevailing during the period in which the grain is filling are most important and active agents in determining the quality of the wheat. Barley and oats are under a similar investigation, but the work has not proceeded as far as that with wheat.

Forage Crops.

Many points of practical importance have been brought out by the chemical study of our grasses, roots and other forage crops. Thus from the analysis of some two hundred native and introduced grasses at different stages of growth we have accumulated data which, in the larger number of instances, indicate a serious deterioration in nutritive value during the latter stages of the plant's life. Cutting for hay before the seed is fully ripe is a practice that receives emphatic support from this work. Many native grasses of the Northwest were found to be highly nutritious and the larger number of the naturally-cured grasses on the prairie were shown to be possessed of valuable feeding properties.

As a result of our study of the Indian corn plant, it was found that, for the silo, the best time to cut is when the kernels are in the glazing condition—that at this period the crop contains the largest amount of digestible matter and will make ensilage of the finest quality.

Similarly, the life-history of rape, of mangels, turnips and many other forage crops has been followed up and much useful information gained.

The examination of the leading varieties of sugar beets has demonstrated the influence of season, soil and culture on the richness and purity of the root. In this work, carried on for more than twenty years, beets grown at the various Experimental Farms throughout the Dominion have been analyzed. The results have furnished ample evidence that beets eminently suited for factory purposes, *i.e.*, for the extraction of sugar, can be grown in many widely distant parts of Canada.

Investigations relative to Horticulture.

In this field the work has been exceedingly varied. Thus, we have fully studied the chemistry of the apple, the strawberry and some other fruits, with a view of learning their particular needs and the rate at which they may exhaust the soil of plant food. Again, much time has been given to the matter of fungicides and insecticides—their preparation and safe application. Finally, in the management of orchard soils, much information of value has resulted from experiments with cover crops as to enrichment of the soil and the conservation or dissipation of its moisture.

Investigations relative to Dairying.

Work under this head has comprised the examination of apparatus used in the testing of milk, cream and butter, the study of processes which have appeared from time to time for the manufacture of butter, the analysis of various dairying products and the determination of the principal factors in their manufacture which control the composition of butter and cheese.

The Farmer's Water Supply.

The examination of well waters from farm homesteads, cheese factories and creameries, has been continued uninterruptedly from the establishment of the Experimental Farms. As a result of this useful work, more than 2,000 samples from rural supplies have been analyzed. A large proportion of these waters have been pronounced polluted and unfit for domestic purposes, a state of affairs which may be said to be entirely due to the common habit of placing the well (generally a shallow one) in the barn yard or in close proximity to some similar source of contamination. The danger to health of polluted water has been emphasized and the importance of an ample supply of pure, wholesome water, both for the use of the family and the stock, constantly urged upon the farming community. Water samples from farm homesteads are analyzed free of charge, but certain directions (obtainable on application) must be followed in their collection and shipment and express charges prepaid.

In concluding this summary, some mention must be made of that phase of the work by which direct assistance is given to the individual farmer. This has been accomplished chiefly through correspondence, though also to a certain degree by agricultural travels which allowed a discussion of soil problems with the farmer "on the ground"; by addresses at meetings of farmers and by the reporting on samples of an agricultural nature sent in for examination.

Chemical Laboratory, interior, Central Farm, Ottawa.

THE DIVISION OF ENTOMOLOGY.

The work of the Division of Entomology may be said, briefly, to have two objects: first, the prevention of the introduction of insect pests into Canada, and second, the control or eradication of injurious insects already existing in this country. As insects affect and destroy forest and shade trees, fruit and fruit trees, field and garden crops, grain and stored products, domestic animals and man himself, the varied and wide character of the work of the Division can be understood. The three methods of attaining the objects in view are by investigation, education and legislation.

The Dominion Entomologist, who has charge of the Division, has the administration of the "Destructive Insect and Pest Act," which was passed in 1910 to prevent the introduction and spreading of insects, pests and diseases injurious to vegetation. In order to prevent the introduction of insect pests from other countries, the Regulations under this Act require that trees, shrubs and other nursery stock shall be imported only during certain specified periods of the year and through certain ports, of which there are nine from Halifax, N.S., to Vancouver, B.C. At six of these ports, fumigation stations are established, where certain classes of trees and plants are fumigated, in houses provided for the purpose, with hydrocyanic acid gas to prevent the introduction of the San José and other scale insects. In addition to this precaution, trees and plants from certain countries are inspected by officers of the Division, either at the port of entry or at the destination of the shipment.

The powers which the Act gives to eradicate pests which have already been introduced into Canada are being used in Nova Scotia and New Brunswick, where an active campaign is being carried on by the Division against the Brown-tail moth, which has recently spread into these provinces from the New England states. The provincial governments of Nova Scotia and New Brunswick co-operate by supplying men to assist the field officers of the Division. In Ontario, the provincial government assists in the inspection of imported nursery stock and, in British Columbia, the provincial government also co-operates in the inspection work.

The Department of Indian Affairs makes an annual appropriation for the cleansing of the Indian orchards in British Columbia. This work is carried on by the Division, and an officer is permanently employed in visiting the orchards on the Indian reservations in British Columbia, for the purpose of assisting and advising the Indians with regard to the spraying, pruning and proper care of their orchards, which otherwise

are frequently a menace to the orchards of neighbouring settlers by reason of their uncared-for condition and the consequent abundance of pests.

One of the chief functions of the Division is the advising of farmers, fruit-growers and others as to the best methods of preventing, controlling or eradicating insect pests. Hundreds of enquiries and specimens are received annually. A cutworm may be committing serious havoc to wheat in Saskatchewan; a miller's flour, or a housewife's carpets may be infested with an injurious insect; a caterpillar may be defoliating ornamental or forest trees; mosquitoes may be making life unbearable in a summer resort on the St. Lawrence, or ticks may be found on horses in Alberta; the apiary of a beekeeper in Quebec may be attacked by disease or bulbs may be destroyed in a florist's garden; such examples will indicate the variety of subjects with which the Division has to deal. In some cases advice can be given immediately; in others, further investigation is necessary.

The co-operation of other Branches of the Department of Agriculture has been secured, in order to render the work useful to as large a number as possible.

An important branch of the Division's work is the study of insects injurious to forest trees; this feature is growing in importance with the increasing necessity of conserving the forests. An officer has recently been appointed to the Division to devote his whole attention to the study of forest insects. In this work, the co-operation of the Forestry Branch of the Department of the Interior has been secured. The enormous extent of the forests of Canada renders the investigation of forest insects a subject of great consequence.

By the provision of experimental insectaries and the establishment of field laboratories in various parts of the country, in which a start has been made, the Division is carrying on investigations in the life history and means of control of insect pests in the regions in which they occur. Much careful study is devoted to the natural means of control of insect pests. Of these means, the chief is the introduction of parasitic insects. Efforts are made to introduce useful parasites as a means of controlling pests otherwise uncontrollable. Statistical studies of parasites in conjunction with field operations, frequently render it possible to forecast the results of the outbreak of an injurious insect.

An Apiary is maintained in connection with the Division for experimental purposes and large numbers of enquiries are received relating to bee-keeping and especially to the treatment and prevention of bee diseases which are spreading to a serious extent in Eastern Canada.

In addition to the educational work which is effected through the medium of the daily correspondence, the Dominion Entomologist, the Chief Assistant Entomologist and the other officers of the Division address the annual meetings of different agricultural and horticultural societies in various parts of Canada. In the matter of public health, a campaign is carried on against house-flies, which cause increased mortality from infectious diseases and unsanitary conditions. Colleges, schools and individuals send in collections of insects to be named and the collection in the Division is gradually assuming a national character; it contains not only Canadian insects arranged in their scientific orders, but, in the case of many of the injurious species, their life histories, and specimens of the injuries they cause, are arranged in cases for educational purposes.

DIVISION OF BOTANY.

The work carried on by this Division is advisory and experimental. There are many problems connected with agriculture and fruit-growing which require careful investigation. The farmer desires assistance concerning the identity and eradication of the weeds that are troublesome in his crops; his live-stock may die as the result of eating poisonous plants of whose nature he is ignorant; or his harvests may be diminished by the injurious action of parasitic microscopic organisms—bacteria and fungi. The fruit-grower also only too frequently has to suffer the partial or total loss of his crop through these minute organisms unless he has the knowledge necessary to guard against such an undesirable result. Information is likewise desired concerning the cultivation of special crops such as broom corn, hemp, and other fibre plants, or interest may be shown in the cultivation and management of drug or medicinal plants. In short, the work of the Botanical Division is manifold in its variety and its extent can hardly be discussed in a few paragraphs. To give a general idea, however, of its scope, a few remarks may be made on the following branches of its work.

Plant Pathology and Mycology.

As the diseases to which our economic plants are subject are mostly due to the action of parasitic organisms, modern scientific methods of studying these diseases include: 1. The microscopic examination of the organism and its effects on the internal structure of the host. 2. The isolation of the causal organism and the growing of it free from any other organism on various prepared culture media. 3. The use of these pure cultures to reproduce the disease in healthy plants followed by the subsequent re-isolation of the identical organism from the plants thus infected. This procedure conforms to the rules laid down as lately as 1882 by the illustrious Robert Koch for demonstrating the connection between a disease and its causal organism. The operations involved are carried on partly in the pathological laboratory situated on the first floor of the main building and partly in the field and in the pathological greenhouse. The laboratory is fully equipped with the apparatus necessary for this work and visitors are sure to find something of interest at any time. Amongst the diseases at present under investigation may be mentioned Silver Leaf of fruit trees, Black Knot of cherry and plum, Scab and Rhizoctonia disease of potatoes, Smut diseases of grain, and several others. In addition to investigation work, a large amount of time is devoted

to the identification of plant diseases sent in by correspondents, and the outlining of methods of control where such are known. A considerable number of inquiries are also dealt with regarding the names of edible and poisonous mushrooms. To facilitate the whole of this work, and for purposes of reference, a collection of fungi, and, in the case of parasitic species, of specimens showing their effect upon the host plant, has recently been begun. At present, this includes contributions by the past and present staff, material sent in by correspondents and a few volumes of Dearness' "Canadian Fungi" and Seymour and Earle's "Economic Fungi."

Weeds and Poisonous Plants.

A large number of plants are received annually from correspondents which are identified and, in the case of weeds, the best methods of eradication given. Experiments concerning the difficult problem of controlling noxious weeds are carried on as opportunity is afforded. An extensive collection comprising all weeds known to occur in Canada is kept and constantly enlarged. This, together with a similar complete collection of plants poisonous to stock, will be found very instructive to the student. New weeds are frequently imported in seeds from other countries and a careful watch is necessary to prevent the establishment of these undesirable aliens.

Botanic Gardens and Arboretum.

The large area set aside for this purpose adjoins the grounds of the Experimental Farm. It is only a few minutes' walk from the car terminus, and is well worth a visit. In the arboretum will be found an extensive collection of trees and shrubs including many introduced plants that have proved hardy in our climate. The collection of maples is especially fine and the conifers or evergreens second to none in this part of the country. The gardens are all planted with the exception of a few of the older trees. In spring and summer they are very beautiful, the many varieties of dainty flowering shrubs and the magnificent collection of lilacs and roses being well worth seeing, while the great variety of herbaceous plants always attracts attention. Later in the year when the vegetation appears in the glorious tints of autumn, the reds and yellows of the maples, the bronze of the oaks and elms and the silvery white of the poplars and willows make a pleasing and picturesque effect against the dark background of fir, spruce and pine. The charming situation and considerable altitude of the arboretum make possible several fine views. One of the most beautiful may be had from a point near the small tool-house almost in a straight line from the south

entrance. From here one has a good view of the valley through which runs the Rideau canal and whose slopes, well clothed with vegetation, make a very pleasant prospect. The interest of this lovely spot has been enhanced by the kindness of H. R. H. The Duchess of Connaught in planting here a memorial tree. Turning to the left along the road for a short distance, a fine view of the towers of the Parliament buildings may be had through a group of old willows and elms, while from many parts of the grounds, the beautiful Laurentian hills may be seen in the distance, forming a background not easily surpassed.

Scientific Collections and Herbarium.

Specimens of botanical and economic interest are carefully preserved and may be seen in the herbarium room of the Division. They will be shown and explained to anyone interested. The herbarium is a very important collection comprising several thousands of sheets of plants carefully preserved, mounted and arranged to facilitate reference. While by no means a complete collection of Canadian plants, yet the herbarium is very valuable, the plants that are lacking being the rarer ones which are not often required for comparison. The Division also possesses a very extensive collection of the seeds of Canadian plants conveniently kept in small glass tubes.

Experimental Plots.

These have always been of special interest to the farmer. They will be found to include nearly every fodder plant under cultivation in this country. Small plots are also used for testing new grasses or other plants with a view to ascertaining their agricultural value. Generally there will be found each year experiments with some crop like millet, hemp, broom corn, etc. The variety tests of clover and alfalfa which have been begun recently with a view to discovering the hardiest strains, their permanence and yield in herbage and seed, should also be found of special interest.

Reference Books and Botanical Library.

Students of plant pathology, mycology or general botany will find a useful reference library on these subjects. Together with the collections, field experiments, and the Botanic Gardens, they provide excellent opportunity for the study of agricultural and economic botany, and the officers in charge will always be pleased to give personal advice and instruction to those interested.

Cotton Front House on Central Farm, Ready for Winter.
(In summer raise curtains and take out glass).

THE POULTRY DIVISION.

On the establishment of the Poultry Division of the Central Experimental Farm in 1887, the production of eggs and the better quality of poultry in winter was comparatively unknown, and the ideas of most farmers on the subject of poultry keeping were very crude. The hens, in the majority of the barn yards throughout the country, were nondescripts and laid only in the spring and summer, moulted in the late fall or during the winter and were thus non-productive when the demand was greatest. Their chickens were usually allowed to "pick up their own living" and, as a result, were lean and scraggy, dressed badly and presented a decidedly uninviting appearance.

The establishment of the Poultry Division of the Experimental Farm was the beginning of a better state of affairs. Its good effects soon began to be felt, its good example to be imitated. The improvement in the class of stock kept and in its management resulted in a greatly increased supply of winter eggs, the chickens were hatched earlier in the season, were fed well and regularly and were carefully cooped. This resulted in a far better quality of poultry flesh being produced.

At that time, the best breed for farmers was considered to be the Barred Plymouth Rock (a comparative newcomer), because they were both good layers and excellent table fowls. Their chickens were hardy, vigorous and quick growers. Later, the Wyandottes made their appearance and proved to be another utility variety of merit.

It was also shown that hens which laid well in winter made early sitters and, with proper treatment, could be induced to moult in midsummer, when weather conditions were most favourable. They were thus ready again to make winter layers. Hitherto, the impression was that the hen moulted at her own sweet will.

From 1890 to 1900 there was a rapid advance in the poultry industry. Some of the incentives to this may be mentioned as follows:—

The practical information conveyed in the annual reports of the Poultry Division; addresses at Farmers' Institutes and other meetings throughout the country; evidence before the Agricultural Committee of the House of Commons; attendance at Fairs, etc. As an instance of the practical results of the experimental work of the Poultry Division, it is shown, in the report of the Poultry Manager for 1903, that 14,289 eggs were laid from December, 1902 to June, 1903, both months inclusive. This covers that portion of the year when the highest prices are obtained. This table and similar ones published in other annual

reports, were indisputable evidence of what could be attained by proper methods of feeding and management. Interested persons said, "If the Experimental Farms, Poultry Division, can attain such results, surely we can try to do the same," and they did so, very successfully.

Another great incentive to the development of the poultry branch of farm work throughout the country was the growing demand, at increased values, for both strictly new-laid eggs and the better quality of poultry. It had been confidently predicted by pessimists that, as soon as the advice to produce eggs and poultry was generally followed, prices would become so low as to make further production scarcely worth while. As a matter of fact, the opposite occurred; increasing, rather than decreasing prices stimulated the farmers of the country to still further interest in their poultry.

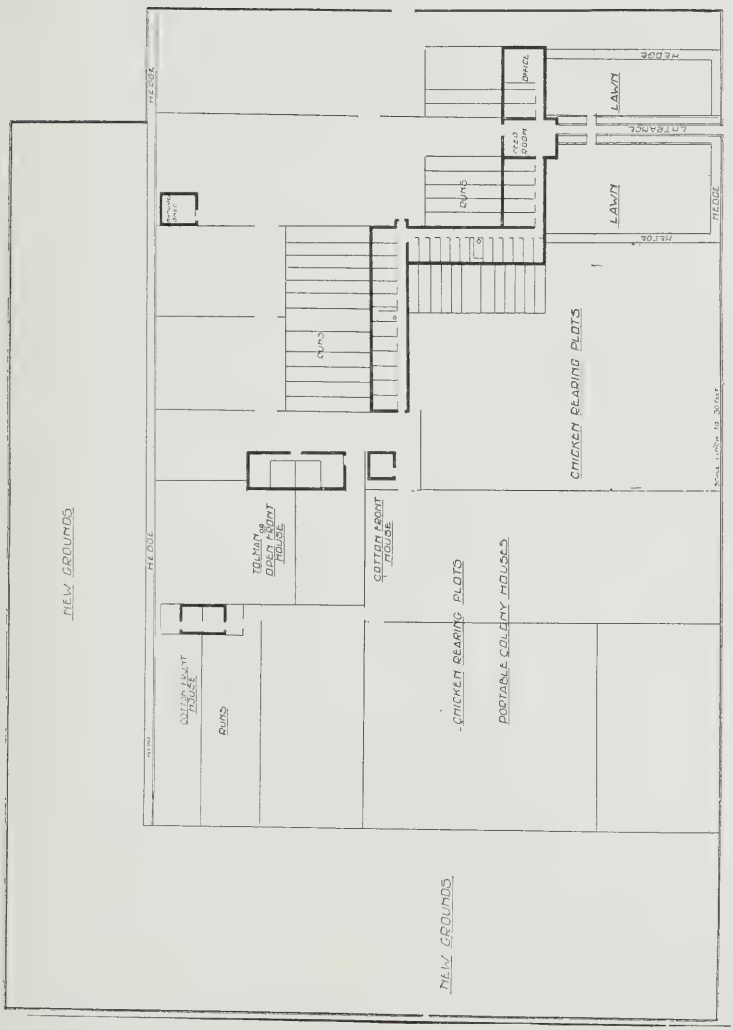
During this period, a poultry department was also established in connection with the Ontario Agricultural College at Guelph, Ont., and the Nova Scotia Agricultural College at Truro, N.S. Both departments are under the charge of skilled instructors and demonstrators and have been great promoters of poultry development in the two provinces named.

From 1900 until the present day, the poultry industry has expanded rapidly along the lines mentioned above. A poultry department was established at Edmonton, Alta., under the auspices of the Provincial Government. Later, one was established in connection with the Manitoba Agricultural College at Winnipeg, Man. In the United States, numerous poultry departments were added to the Experiment Stations and Agricultural Colleges.

In 1906, Bulletin No. 54, on "The Breeding, Feeding and General Management of Poultry" was issued from the Poultry Division of the Central Experimental Farm and at once secured a large circulation. Owing to the continued demand, a second edition was issued in the year 1908. The evidence given by the Poultry Manager in the spring of 1911 before the Committee on Agriculture and Colonization of the House of Commons on "The Production of Eggs in Winter," which was afterwards printed in pamphlet form, was extensively circulated in different parts of the country.

An interesting feature of this stage of poultry progress was the rapidly growing value of the home market in face of increased production and decreased exports, as shown by the following official figures:—

In 1902 we exported	11,635,108	doz.	eggs,	value	$1,733,342.
" 1909 "	552,850	"	"		124,315.
" 1910 "	160,650	"	"		41,766.



Poultry Division, Central Farm, Ottawa.

The largely increased production, together with the constant upward tendency in prices in spite of the rapidly diminishing volume of exports, is conclusive evidence of the expansion of the home demand.

In consequence, there was a general desire on the part of poultry-keepers to hatch out early pullets so as to have fall or early winter layers. But an unforeseen obstacle to this laudable end presented itself in the shape of weak germs in eggs laid during the early spring. A satisfactory percentage of strong chickens which would live was exceptional. This led to close investigation into methods of housing, feeding and management. Eventually, the conclusion was arrived at that the long term of living under artificial conditions, to which the hens were subjected during the winter months, was a prime cause. Carefully-conducted experiments showed plainly that it was not until the hens had had an opportunity to run outside after the disappearance of the snow in spring (usually about the end of March) that the fowls recovered their lost vitality and the germs of the eggs became strong. Comparisons between fowls kept in partially-warmed houses and those in open and unheated buildings, where the air, although cold, was dry and always fresh, were altogether in favour of the latter system.

This led to a revolution in methods of housing and manner of feeding. The bottled-up plan of house, where the entrance of cold air was carefully guarded against, gave way to the open front and the cotton front styles. Both of these plans of housing became popular and were quickly succeeded by the colony, or entirely open style of house. These different systems, with improvements, are extant to this day, and have been found conducive to health of fowls, egg production and strength of germs in spring. The cold, or open front, system of housing led to a radical change in the method of feeding. The mash, or moist, method gave place to the dry, or hopper, system.

Poultry houses of the cotton front and Tolman, or open front, styles are on trial in the Poultry Division at present. Their location is shown on the plan of the poultry buildings and grounds, to be found on another page.

Experimental work of the past twenty-three years has led to the following conclusions, namely:—

Variety in rations is necessary to successful egg production during winter.

Where there is variety in rations, there is not likely to be egg-eating or feather-picking.

With proper treatment, hens may be induced to moult in summer.

The house with cotton front is conducive to health of the birds and egg production.

To have strong and robust chickens which will grow rapidly, the parent stock require to be constitutionally strong.

A prolific strain of egg layers can only be had by systematic, careful and painstaking breeding from the best egg layers.

Lice-infested hens are not likely to prove profitable. Both hens and henhouse should be entirely free from vermin.

Chickens that are allowed to "pick up their own living" do not make early layers nor desirable market poultry.

A proper poultry house should be free from draught, well ventilated and perfectly dry. Under these conditions, eggs in winter may be expected.

A cold should be attended to at once, or it will develop into roup, which is both infectious and contagious.

Both lime water and water-glass have been found satisfactory egg-preserving liquids. The eggs should be perfectly fresh when put into either solution.

Summer eggs of undoubted freshness and flavour must be—

(a) Strictly new laid when sent to city dealer or sold to private customer.

(b) They should reach the consumer within one week of being laid.

(c) Should be non-fertilized.

(d) After being taken from nests—until shipped or sold—should be kept in a sweet-smelling cellar or cubpoard.

Winter Eggs—

(a) Should be collected before being frozen.

(b) Sent to city dealer, customer, or sold on market within ten days of laying.

(c) Kept meanwhile in clean, sweet-smelling storing place.

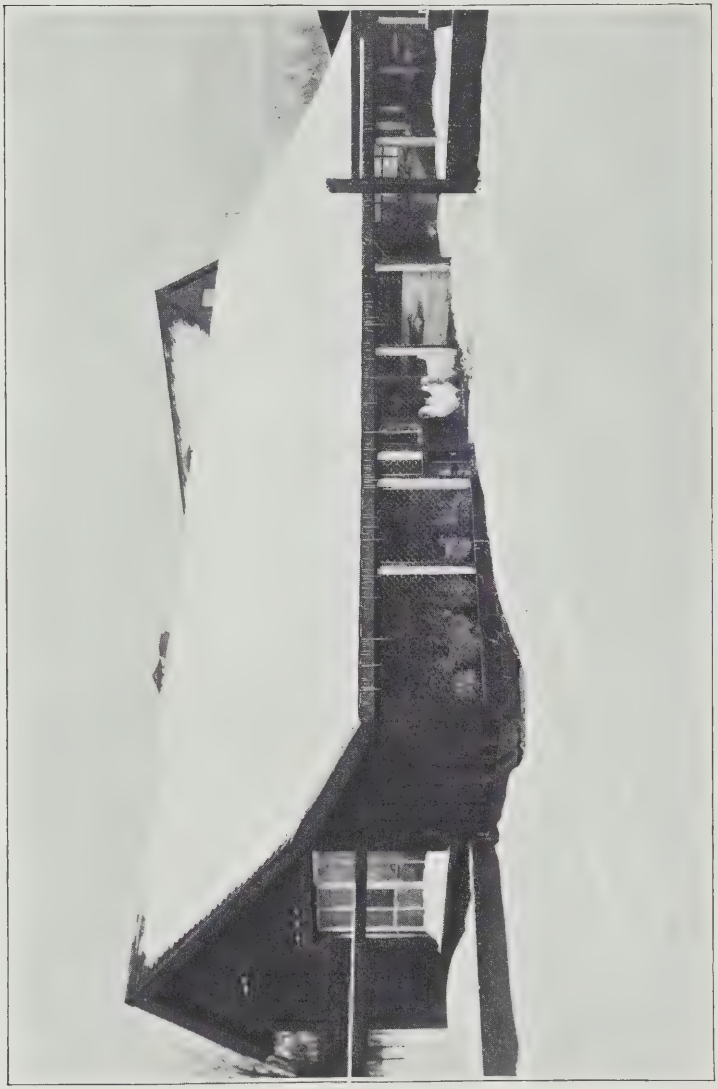
(d) Preferably non-fertilized, but this is not so strictly insisted on as in the case of summer eggs, for in winter there is not the risk of germ development.

Eggs in Both Seasons.—In order to have the desirable flavour at all seasons, eggs should come from cleanly-fed and kept hens. The fowls should not have access to decaying animal or vegetable matter This particularly applies to summer. The nests at all times should be clean, comfortable and free from lice. The largest eggs will be laid by hens, although pullet may yield a greater number. Whether laid by hens or pullets, the eggs, to be of large size and good quality, must come from generously fed birds.

Poultry of Best Quality.—To have chickens of the desirable type and quality they require to be—

(a) Of correct market type. This is brought about by breeding from parent stock of like type.

(b) They should be carefully housed and regularly fed from time of hatching until saleable age.



The Tolman House, Ottawa.

(c) They should not be expected to "pick up all their own living." This practice is too common. Chickens so treated or in any other way neglected are not likely to make good market specimens, breeding stock or show birds.

(d) Chickens, their coops and colony houses should be kept free from lice. Lice-infested chickens do not thrive.

(e) A thriving chicken should be a hearty eater, an industrious forager, and a quick grower.

The faithful observance of the foregoing conditions is likely to be followed by the best results in the rearing of the better class of table poultry and the obtaining of reliable eggs.

EXPERIMENTAL STATION

FOR

PRINCE EDWARD ISLAND

CHARLOTTETOWN, P.E.I.

Establishment.

The Experimental Station for Prince Edward Island was established in August, 1909. The farm was bought by the Provincial Government and leased to the Federal Department of Agriculture. Possession was obtained of the property known as "Ravenwood" at that time, and of the several other properties in January, 1910. The eastern part of the Johnson properties, though conveyed, is held under a former lease which does not expire until 1917. The Beer property, though promised, has not yet been conveyed.

Location.

The Experimental Station property extends from the Queen's County Jail site, north along the east side of the P. E. Island Railway to the De Blois Road. It occupies all that block of land to the north-east of the City of Charlottetown which lies between the P. E. Island Railway on the west, the Mount Edward Road on the east, the De Blois Road on the north and the Corporation limits of the City of Charlottetown on the south, with the exception of nine acres on the north-east corner which is owned by Judge R. R. Fitzgerald. A small triangular portion of the "Ravenwood" property lies on the west side of the Railway. Charlottetown, the capital of the Province, is the nearest city. It is centrally located in Queen's County and lies a little to the east of the centre of the Island. The Post Office, Railway Station and business quarter of the City are about a mile distant. The wharves and water front are about a mile and one-quarter away.

Area.

There are 59 acres of land occupied by the Experimental Station. The addition of the eastern portion of the Johnson property will add 6·85 acres, this, with the Beer property, 1·5 acres, will give a total of 67·35 acres of land.

Main Drive, Charlottetown.

The Barns, Charlottetown.

The land at the north toward the De Blois Road slopes to the north and west. The central portion of the farm slopes to the west, there being quite a steep hill between the buildings and the Railway. From the buildings toward the City the slope is to the south as far as the St. Avards Road. The area south of this cross-road has a slight ridge across its centre from the N.-W. to the S.-E., the land sloping gently away on either side.

Soil.

The soil in general is a sandy loam underlaid with a hard-pan of brick-clay. The sub-soil over a large area of the Farm is so impervious to water that it was found necessary to underdrain not only the low areas but also several sections of the higher land. Many different types of soil are represented in the low areas, ranging from almost pure sand to a heavy clay. Two acres of swamp land, that was cleared and tile-drained, has a pure peat soil three feet deep.

About 20,000 ft. of tile drains have been laid. The drains are 33 ft. apart, except where they are used to carry off the seepage along the hillside. The regular system extends over 14 acres. The partial system drains a little more than 6 acres. In the swamp, blind wells were sunk, into which the tiles discharge, the underlying strata of rock being open and porous.

Buildings.

The Superintendent's residence was repaired and suitable buildings erected, namely, a barn 60 x 40 ft., machine house 80 x 25 ft., and a foreman's house 32 x 28 ft. These are prominently situated to the south of a beautiful shelter belt of hardwoods and young conifers.

Horses.

Three draft horses and one heavy driving horse have been purchased to do the work on the farm.

Sheep.

Experimental work with sheep began in 1911, when thirty lambs were purchased on November 15th. These were divided into three groups and fed a uniform grain ration with three different types of roughage: 1st, alfalfa hay and oat straw; 2nd, corn stover and timothy hay; 3rd, timothy hay and roots, the grain ration being gradually increased as the fattening period progressed. Work along this line will be continued.

Rotations.

Six rotations were laid out on the 17 acres at the north end of the farm as follows: 1 seven, 2 five, 2 four and 1 three year rotation. These will all be commenced in 1912. Noxious weeds will be destroyed by systematic work on some of these rotations, while important principles in farm practice will be demonstrated on others.

Cultural Experiments.

A series of cultural plots demonstrating various methods of field culture, *e. g.*, depth of ploughing, manner of harrowing and rolling, etc., will be located near the southern boundary of the Farm.

Cereals, etc.

Experiments are conducted with many sorts of cereals, grasses, clovers and corn, to determine the varieties best adapted to the soil and climatic conditions of the Province. Those which prove to be of special merit are multiplied on larger areas and sold to men who will further multiply them in different sections of the Island so that farmers everywhere may, in a short time, be able to get seed. About one hundred cereal test plots of one-sixtieth of an acre each are grown. These contain the uniform test plots as grown at all the Experimental Farms and also many strains produced by members of the Canadian Seed Growers' Association. These are grown for examination and comparison. Excursions should be arranged for August when the plots are in good shape for inspection.

Horticulture.

Tree Fruits.

On the slope between the Superintendent's residence and the St. Avards Road, two or more specimens of the leading varieties of fruit trees have been set out: 78 varieties of apples, 16 of cherries and 78 of plums. The 18 varieties of pears were set just east of the beds of perennials, between the residence and the Mount Edward Road. An old orchard of 21 apple, 4 cherry and 5 plum trees is bearing fruit; these, together with the new trees, make a total of 376. Various cover crops are being tested among these trees.

Small Fruits.

Sixteen varieties of early hardy grapes were planted east of the pear orchard. Fourteen varieties of black currants, 15 of

Grain Plots, Charlottetown.

red, and 7 of white, were set at the north of the small fruit plantation. Seven varieties of black-cap raspberries, 2 of purple, 4 of red and 1 of white were planted south of the currant bushes. Ten varieties of gooseberries were planted east of the raspberries. Three varieties of blackberries were planted south of the gooseberries, while to the south of these is a plot of dewberries. Twenty-one varieties of strawberries were planted among the grapes in 1910, 25 more in 1911 on the east side of the small fruit bushes. Total number of small fruit plants, about 2,700. These have made excellent growth and attracted much attention, showing that the soil and climate is well adapted to this line of horticulture.

Trees and Shrubs.

More than 1,200 trees and shrubs have been planted at the Experimental Station; these were placed in groups on the lawn, along the P. E. Island Railway from the De Blois to the St. Avards Road. Among these are many beautiful and rare flowering shrubs which are being tested for hardiness, etc.

Vegetables.

The vegetable garden is situated near the Mount Edward Road just south of the grape vineyard. In it are more than 200 plots of vegetables and roots. A great many varieties of the common vegetables are grown, while some of the rarer ones tested are: egg-plant, parsley, pepper and watermelons. This garden has proved to be of great interest to visitors and much valuable and interesting information has been gained from it.

Flowers.

The flowers, to many, are the most attractive feature on the farm. Throughout the whole season, from when the snow leaves until its return, a most beautiful display of choice flowering plants greets everyone who approaches the Station buildings. Many hundreds of the choicest varieties of tulips, narcissi and crocuses, with squills and other bulbs, send up their delicate flowers during the early spring. A four-foot border of annuals extends most of the way from the Superintendent's residence to the Mount Edward Road. On the eastern lawn are groups of perennials comprising irises, pæonies, roses, asters, dahlias and many others, which make a beautiful showing, while back of them fifty or more varieties of sweet peas make a veritable wall of beauty until the late autumn. In the pond to the west of the buildings, varieties of southern water-lilies brighten the surface, while, around the edge, Japanese irises have been planted. In all, more than 400 perennials or groups of annuals are to be seen.

Records.

A very complete system of horticultural records was commenced in the Spring of 1911. Every tree, shrub, vegetable and flower is examined from time to time throughout the year, and notes recorded giving annual growth, hardiness, general condition, diseases and other items. Among these are many minute details which apply to the different classes, as the dates the flowers open, their period of full bloom and when their bloom is over. These are at the Experimental Station at Charlottetown where they may be examined by those interested. Copies for reference are sent regularly to the Central Experimental Farm at Ottawa.

Detail of Rotations as Indicated on Map of Experimental Farm at Charlottetown, P. E. I.

ROTATION "G," COMMENCED 1912.

1st year.—Oats.
2nd year.—Hoed crop.
3rd year.—Wheat.
4th year.—Clover hay.
5th year.—Timothy hay.
6th year.—Pasture.
7th year.—Pasture.

ROTATION "C," COMMENCED 1912.

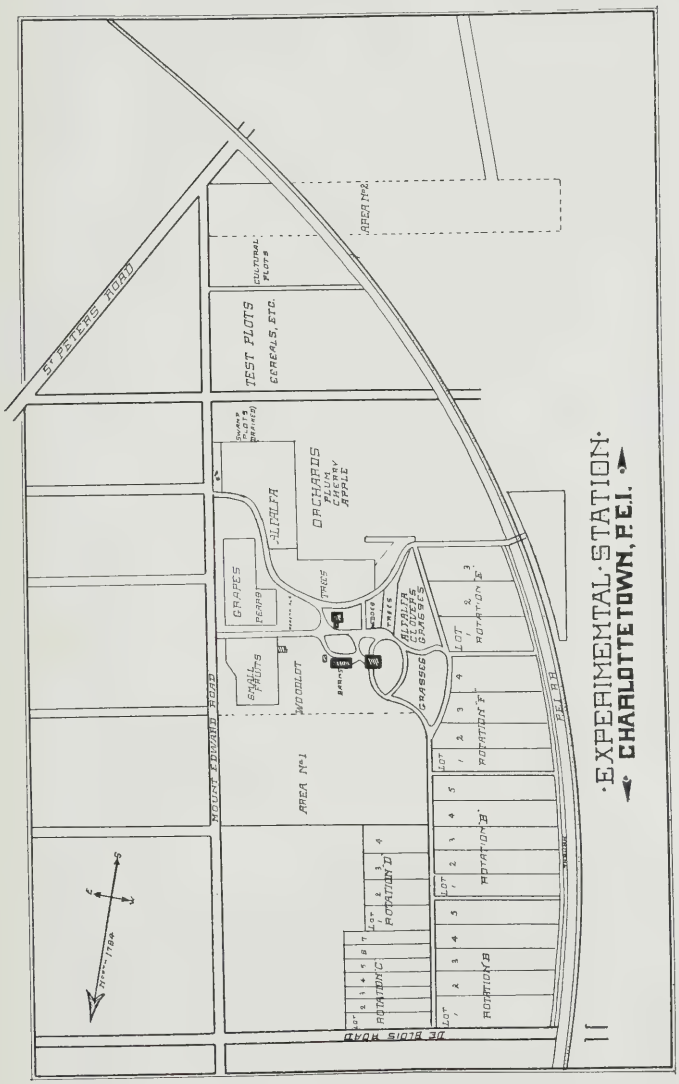
1st year.—Hoed crop.
2nd year.—Grain seeded down.
3rd year.—Clover hay.
4th year.—Pasture.

ROTATION "A," COMMENCED 1912.

1st year.—Roots.
2nd year.—Grain seeded to timothy, alsike and red clover.
3rd year.—Hay.
4th year.—Hay, ploughed in early fall.
5th year.—Grain.

ROTATION "B," COMMENCED 1912.

1st year.—Hoed crop.
2nd year.—Grain seeded down.
3rd year.—Hay.
4th year.—Grain seeded down.
5th year.—Hay.


EXPERIMENTAL STATION
CHARLOTTETOWN, P.E.I.
ST PETERS ROAD
TEST PLOTS
CEREALS, ETC.
AREA No 2
ORCHARDS
PLUM
CHERRY
APPLE
ALFALFA
GRAPES
PEARS
SMALL FRUITS
WOODLOT
AREA No 1
ROTATION A
ROTATION B
ROTATION C
ROTATION D
ROTATION E
ROTATION F
LOT 8
LOT 9
DE BLOIS ROAD
GRAVEL ROAD
N

ROTATION "D," COMMENCED 1912.

1st year.—Hoed crop.
2nd year.—Grain seeded down.
3rd year.—Clover hay.
4th year.—Grain seeded to clover.

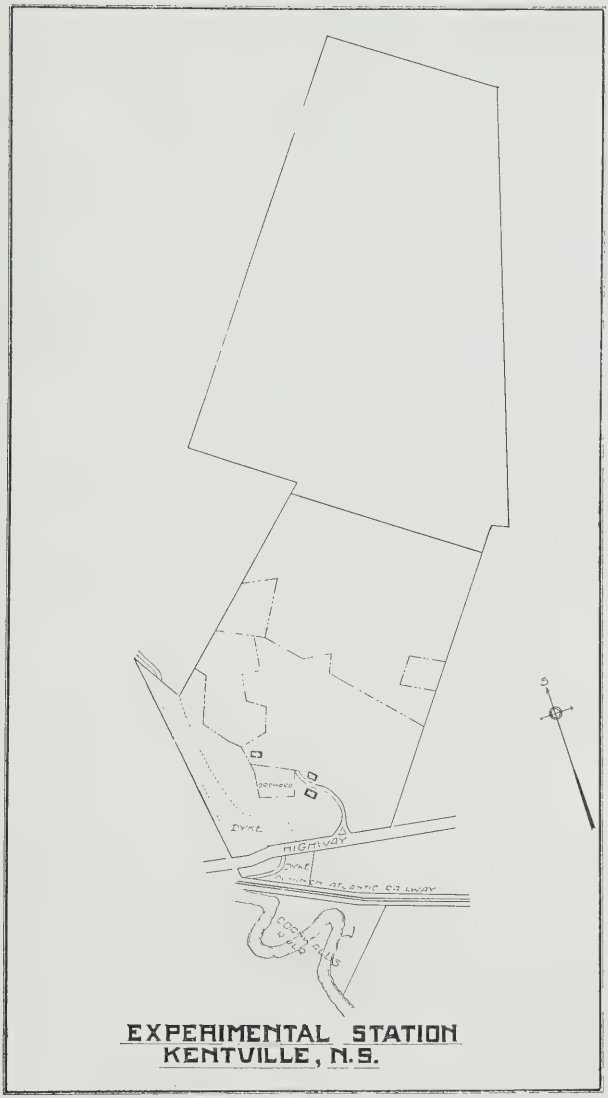
ROTATION "D," COMMENCED 1912.

1st year.—Hoed crop.
2nd year.—Grain seeded down.
3rd year.—Hay.

AREAS INDICATED BY DOTTED LINES.

Area No. 1.—Johnson property. Will be part of farm in 1917.

Area No. 2.—Beer lot; to be conveyed in 1912.



EXPERIMENTAL STATION
KENTVILLE, N.S.

EXPERIMENTAL FARM

FOR

NOVA SCOTIA

NAPPAN, N.S.

The Experimental Farm for Nova Scotia, formerly called the Experimental Farm for the Maritime Provinces, is situated at Nappan, in the County of Cumberland, Nova Scotia, about eight miles from the border of New Brunswick. It is on the line of the Intercolonial Railway, one half mile from Nappan Station and five miles from the town of Amherst.

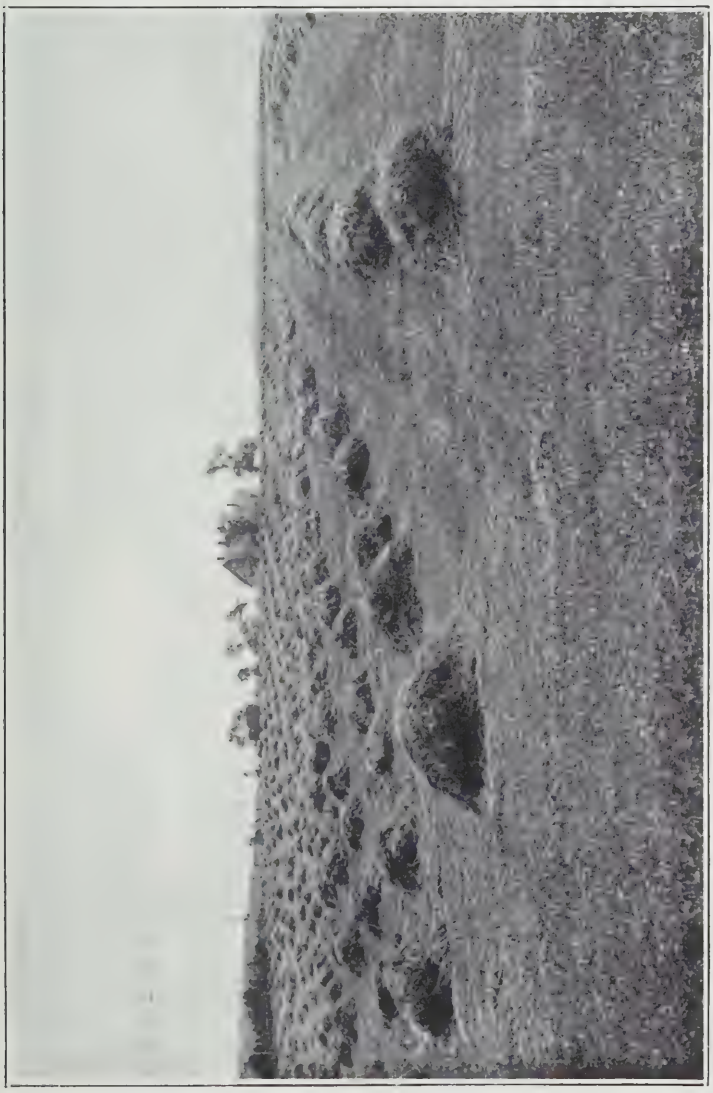
The farm contains, in all, about three hundred acres, some forty-five of which is dyke or marsh land, formed by the overflow of the tides from the Bay of Fundy depositing a sediment which makes quite valuable soil for the growth of hay in particular, when dyked in as has been done on the Experimental Farm. The upland, 120 acres of which is under cultivation, consists of a great variety of soils; most of this is in a fairly good state of fertility at present. The remainder of the farm area is in woods and rough, uncultivated land.

The soil of the farm is chiefly clay loam, with some parts gravelly, and with a subsoil varying from clay to gravelly clay, with more limited areas of a light gravelly character. About thirty acres of the part nearest the road was underdrained some fifteen years ago with good results. Ten acres of marsh land has also been underdrained; the results in this case, however, have not been so good, up to the present time.

In the general work of this farm, besides the carrying on of experiments with all classes of cereals, roots, grasses, vegetables, fruits, etc., the one object above all others has been to maintain, and on some areas, to increase, the fertility of the soil, while at the same time taking from it large crops continuously. To this end, much attention has been paid to the keeping of live stock and the rotation of crops, in which clover-growing has played an important part.

At present, three separate rotations are being carried on, one of three, one of four, and a third of five years' duration, in each of which is used one root or hoed crop with manure and at least one clover crop, the aftermath of which is turned under in most cases, in the belief that the great lack in the soils of the Maritime Provinces is humus.

Various experiments have been carried on with dairy and with beef cattle, with swine, and to some extent with sheep, although no comprehensive series with the latter has yet been



Haying, Nappan.

worked out. No experimental work with horses has been done, as they are kept here for farm labour alone.

Work in connection with the testing of varieties of apples and plums, to determine their relative suitability for the climate of this section of the eastern provinces has been carried on since the establishment of the farm. The first orchard set out, being in an extremely exposed position, with unfavourable soil conditions, made unsatisfactory progress for some years. Ten years later, another orchard was set out in a more sheltered and suitable locality and has done exceptionally well. A third, $2\frac{1}{2}$ acres in extent, was set out in 1911, and will be conducted on a commercial basis, using eighteen of the varieties proven to have done best in the other orchards, namely, Duchess, Wealthy, Wolfe River, Red Astrachan, McIntosh Red, American Golden Russet, Bethel, Spy, Talman Sweet, Blue Pearmain, Baxter or La Rue, Pewaukee, Arabka Winter, Grimes' Golden, Charlamoff, Winter Bough, Hurlbut, and Rome Beauty.

Plums have given very fair results here as a rule, although they have not been tested under as favourable conditions as might be wished.

With strawberries, raspberries, and currants, the tests conducted have been extensive and the results obtained most satisfactory, almost all varieties tried having grown vigorously and yielded well.

Little success has been attained with grapes, owing to the shortness of the season.

Practically all kinds of vegetables, including potatoes, have been grown successfully on the Farm, the climate being especially suitable for garden crops.

With flowers, results have always been satisfactory. Perennials have wintered well every year, and, having attained a large size, display heavy masses of bloom. Dahlias and tulips also do well. In annuals, practically all are started in hot beds and transplanted from flats to the open, for, as a rule, springs are late. These, in suitable seasons, have also bloomed freely.

Details of Rotations as indicated in the Plan of the Experimental Farm at Nappan, N.S.

ROTATION "B," COMMENCED 1911.

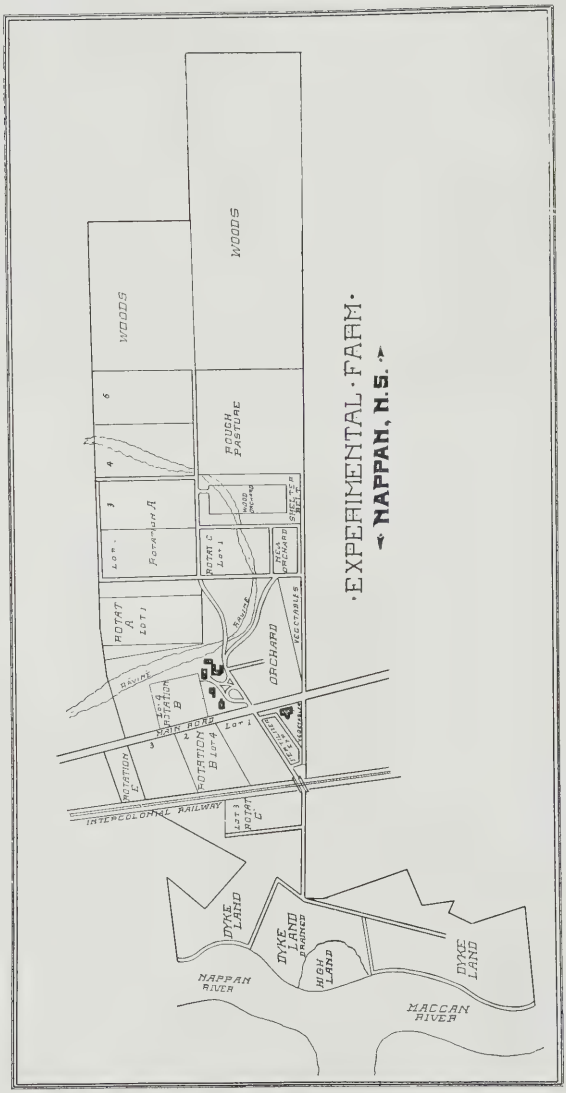
1st year.—Roots or corn.
2nd year.—Coarse grain seeded to clover.
3rd year.—Clover hay, aftermath turned under.
4th year.—Coarse grain, seeded to clover.
5th year.—Clover hay, aftermath turned under.

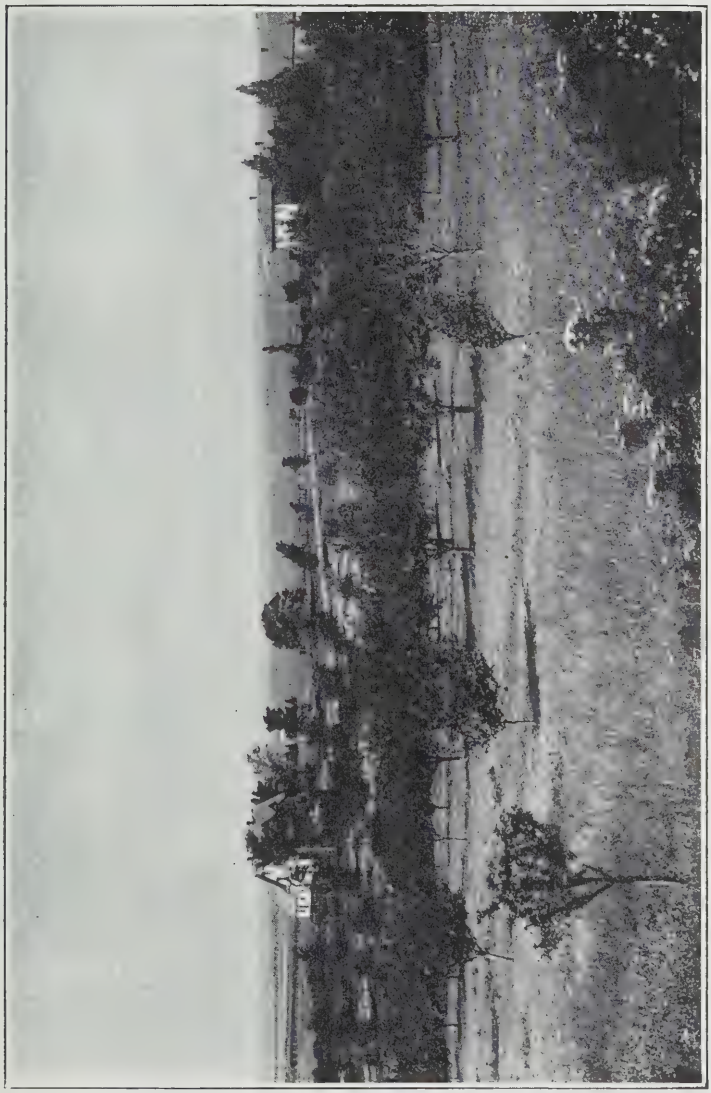
ROTATION "C," COMMENCED 1908.

1st year.—Roots or corn.
2nd year.—Grain seeded to clover.
3rd year.—Clover hay.
4th year.—Pasture.

ROTATION "D," COMMENCED 1911.

1st year.—Roots or corn.
2nd year.—Grain seeded to clover.
3rd year.—Clover hay.


EXPERIMENTAL FARM
NAPPAN, N.S.
WOODS
WOODS
ROUGH PASTURE
ROTAT A LOT 1
ROTATION B
ROTATION B LOT 4
ROTAT C LOT 1
ROTAT C LOT 2
ROTATION E
ORCHARD
VEGETABLES
MAIN ROAD
INTERCOLONIAL RAILWAY
DYKE LAND
DYKE LAND PARTLY
HIGH LAND
DYKE LAND
NAPPAN RIVER
MACCAN RIVER



Orchard, Nappan.

EXPERIMENTAL STATION

FOR

CENTRAL QUEBEC

CAP ROUGE, QUE.

Establishment.

This Station was established on January 1st, 1911. It comprises lots 23, 26, 27, 30, 31 of the first concession of Demaure Seigniory, in the parish of Cap Rouge, county of Quebec, and is in a solid block.

Location.

The farm is in Cap Rouge village, and about nine miles from Quebec City. It is not more than a mile from the macadamized roads of Ste. Foye and St. Louis, the two splendid highways which constitute the famous Cap Rouge promenade.

Facilities of Communication.

The nearest railway station is Cap Rouge, half a mile from the farm buildings, on the Canadian Northern Railway. This line goes from Quebec to the St. Maurice River, also to Montreal. The Grand Trunk Pacific touches the north-east corner of the property, whilst the C.P.R. station at Lorette is not five miles away. The new line of the Canadian Northern to the Quebec bridge meets that of the G. T. P. in Cap Rouge village. The name of the Post Office is also Cap Rouge, and is less than a mile from the farm.

Area.

The property consists of 326 acres, of which 160 are in cultivation, 30 used for ornamental grounds, paddocks and buildings, 21 a steep side-hill, 64 in brush, and 51 in forest. It is all tillable, with the exception of about 25 acres. The land slopes to the south, for a distance of from one to two thousand feet from the southern boundary, which is the main road from Ste. Foye and Sillery to St. Augustin. The rest of the farm is practically level with, however, enough gentle fall to the north-east to admit of easy drainage.

Soil.

The soil, not very fertile, varies from a sandy to a heavy clayey loam. These are generally separated by areas of a mixed

composition, having some of the characteristics of the land on each side. The subsoil is shale, which is found at varying depths. There is soil suitable for every cereal, vegetable or fruit which will thrive in Central Quebec.

Drainage.

About 120 acres are drained, but in some places with tile of too small a diameter. The other 40 acres need drainage, also most of the land which is to be cleared. The latter is a great deal more fertile than that which is now in cultivation.

Buildings.

They comprise the Superintendent's, the foreman's, the herdsman's, the ice, the scale, the well, and the boarding houses, the horse stable, the cattle barn, the piggery, the hennery, implement, also wagon sheds, store for tools, blacksmith shop, and shelters for colts, calves and swine, in the paddocks. They are all painted red, with white trimmings, except the Superintendent's and foreman's houses, and present a very pleasing appearance. Situated as they are, about 150 feet above the mighty St. Lawrence, they can be seen from all ocean steamers and river boats which go up to Montreal. The site of the Station is admitted by all who visit the farm to be one of the most beautiful to be seen in any land.

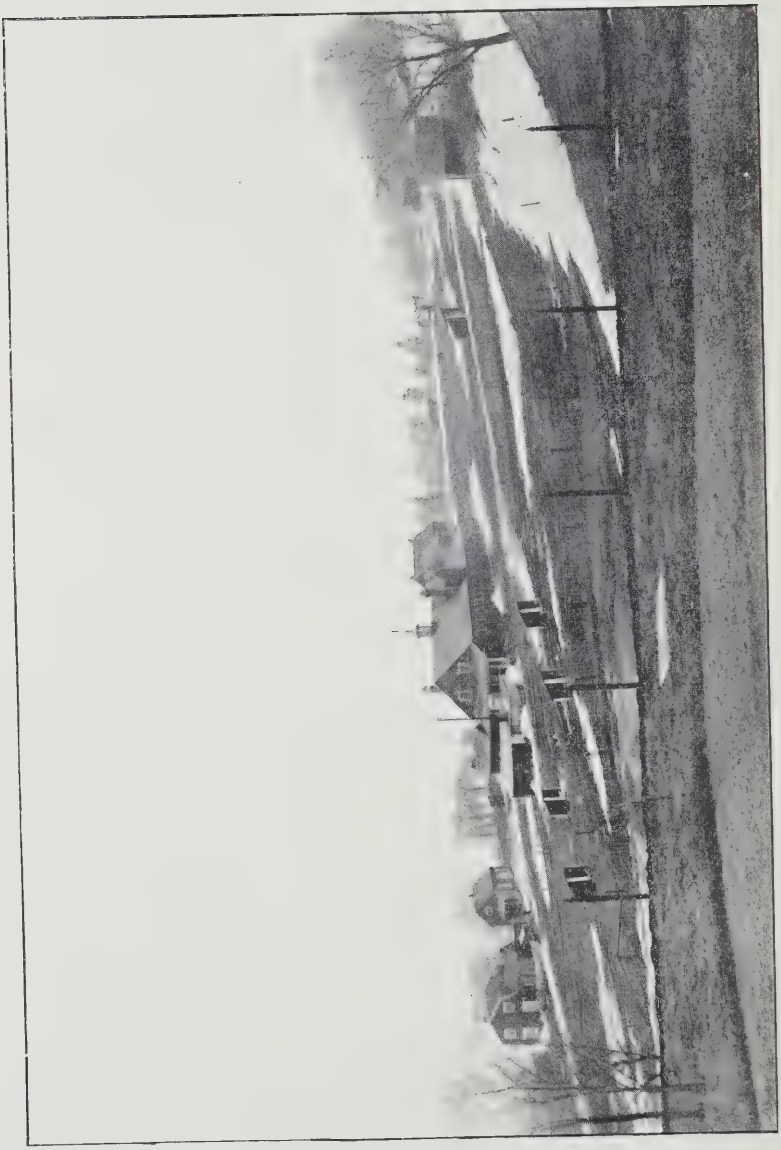
Agronomy.

Methods of cultivation found most suitable.—For the lighter land, shallow ploughing early in the summer, with frequent harrowings until late, to keep down weeds and to store moisture for next season. For heavy soil, deeper ploughing, with frequent harrowings, and ribbing the last thing before frost, to leave a larger surface for frost to work on, thus killing many weeds and insuring a good seed bed.

Cultural Experiments.—Not much could be started the first season, but this part of the work is being enlarged as rapidly as possible. As Indian corn, for silage, is bound, with time, to become the most important forage crop for Central Quebec, an experiment is being made as to the yield of sowings at different distances apart.

Rotations.

Eight rotations are laid out: one 3-year, one 4-year, two 5-year, three 6-year, one 8-year. A well-fenced road will be made through all of these, so that anybody driving around one lot of them can see every acre very well. (For details see plan.)



The Piggery, Cap Rouge, Que.

Trial Plots.

A good number of these are put in every year, comprising the leading varieties of turnips (Swedes), sugar beets, mangels, carrots, Indian corn, oats, two-row barley, six-row barley, wheat, also some rye, hemp, broom corn, etc. Work along these lines has also been begun with red clover, alfalfa and timothy, with the idea of crossing some of them. The trial plots always seem to interest farmers, who can see for themselves the sometimes great difference between adjoining varieties as to length of straw, early ripening, etc. In 1911, for instance, the Sixty Day oats were cut while the Thousand Dollar were still green though they had been sown the same day.

Live Stock.

Horses.—There are four teams of heavy work horses and a light driver. An experiment is being made to see how cheaply idle horses can be wintered on rough hay, straw and roots, and still be in good shape for the next season's work. The animal chosen is a grade Clydesdale gelding weighing about 1,400 lbs. He receives one pound each of the above-named feeds per day for each hundred of his own weight.

Cattle.—The herd, during the winter of 1911, consisted of 1 bull, 21 cows, 4 heifers, registered Canadians and grades. The average price paid for the females is such that any farmer can give. It is expected that with good care and feeding, along with the use of a pure-bred bull, the heifers raised will be, in a great many cases, larger and better milkers than their dams. Time alone can tell whether our expectations will be realized.

Swine.—A small but select herd of registered Yorkshires is kept, but no experimental feeding has been undertaken yet (in 1911).

Poultry.—Two pens of White Wyandottes give good satisfaction as a dual purpose breed. The pullets generally begin to lay at six to seven months. Some experimental work in artificial hatching is carried on.

Horticulture.

Tree Fruits.—A commercial orchard of apples, comprising 192 trees of varieties which are sure to thrive in Central Quebec, was planted in 1911. Some three hundred more trees will be added in 1912, and perhaps as many in 1913. Besides these, there were 111 in the variety test rows. Some 89 plums, 36 cherries, and 13 pears were set in 1911, and probably 200 more of the two first mentioned will be planted.

Cover Crops in Orchard.—In an experiment with cover crops, the land was cultivated at different intervals up to the first week in July, so as to store as much moisture as possible, and then one-third of the orchard was sown to rape, one-third to buckwheat, one-third to rape and buckwheat mixed. Besides taking up water from the soil, so as to ripen the wood of the young trees, these cover crops helped to kill the couch grass which was very thick on this piece of ground. For the latter purpose, rape was easily the best. Buckwheat gives fairly good results until fall, when it shells, the stalks dry up, and there are lots of open spaces for the sun to go through. If the autumn is warm and wet, this gives a chance to the couch grass to start anew. With rape, the ground is well covered until after it is frozen hard, as the first frosts do not affect this plant very much.

Small Fruits.—In 1911, 90 black currant, 72 red currant, 18 white currant, 60 gooseberry, 168 raspberry bushes and 134 strawberry plants were put in. This is to be followed by a few more varieties of the four first mentioned, whilst several hundreds of the two last named will soon be set.

Vegetables.—Over 200 varieties are tested annually, and notes are taken as to dates of sowing, germination, pricking, transplanting, blooming, also when ready to use, height and weight of each lot pulled or picked. Seed is saved from some of the best plants, a row being sown the following year from seed of one plant only. This can be done only with a rather limited number of vegetables, in Central Quebec, but it seems to be important work, when seed of the same variety of cabbage, for instance, from different seedsmen, often shows such wide variations. Vitality, which is of such importance in seeds for our field crops, is of only secondary importance for vegetables. For these, the question of being true to type seems to surpass all others. No doubt, some improvement can be made in this direction by sowing seed separately from one plant only.

Flowers.—From 100 to 125 varieties of annuals are tested each year, and our flower garden is generally the admiration of every one who visits the farm. Plants which bear the best flowers are marked, and seed saved later, when possible. Each plant is represented the following year by a separate row, and whilst we do not expect, with this very simple method of selection, to achieve wonders, we may, nevertheless, gradually improve a few varieties and obtain a greater uniformity in some special feature.

Ornamental Grounds.—A definite plan of improving the looks of the property, near the main road, has been decided upon, but it may take a few years to complete the work, as the regular force of men will do most of it, at odd times. When finished, these improvements will make of the Cap Rouge

Station, with its unrivalled site, one of the prettiest places which can be seen.

Description of plan of Cape Rouge Experimental Station.

1.—Horse stable.
2.—Scales.
3.—Wood shed.
4.—Foreman's house.
5.—Herdsman's house.
6.—Boarding house.
7.—Piggery.
8.—Cow barn.
9.—Creamery.
10.—Ice house.
11.—Superintendent's house.
12.—Tools.
13.—Wagons.
14.—Hennery.
15.—Implements.

16.—ROTATION "D," COMMENCED 1911.

1st year.—Hoed crops. 12 tons manure per acre.
2nd year.—Grain, seeded down to timothy, alsike and clover.
3rd year.—Hay, cut twice, if possible.

17.—ROTATION "C," COMMENCED 1911.

1st year.—Hoed crops. 16 tons manure per acre.
2nd year.—Grain seeded down to timothy, alsike and clover.
3rd year.—Hay.
4th year.—Pasture.

18.—ROTATION "B," COMMENCED 1913.

1st year.—Hoed crops. 20 tons manure per acre.
2nd year.—Grain.
3rd year.—Hay.
4th year.—Grain.
5th year.—Hay.

19.—ROTATION "A". COMMENCED 1912.

1st year.—Hoed crops. 20 tons manure per acre.
2nd year.—Grain.
3rd year.—Hay.
4th year.—Pasture.
5th year —Grain.

20.—ROTATION "I". COMMENCED 1912.

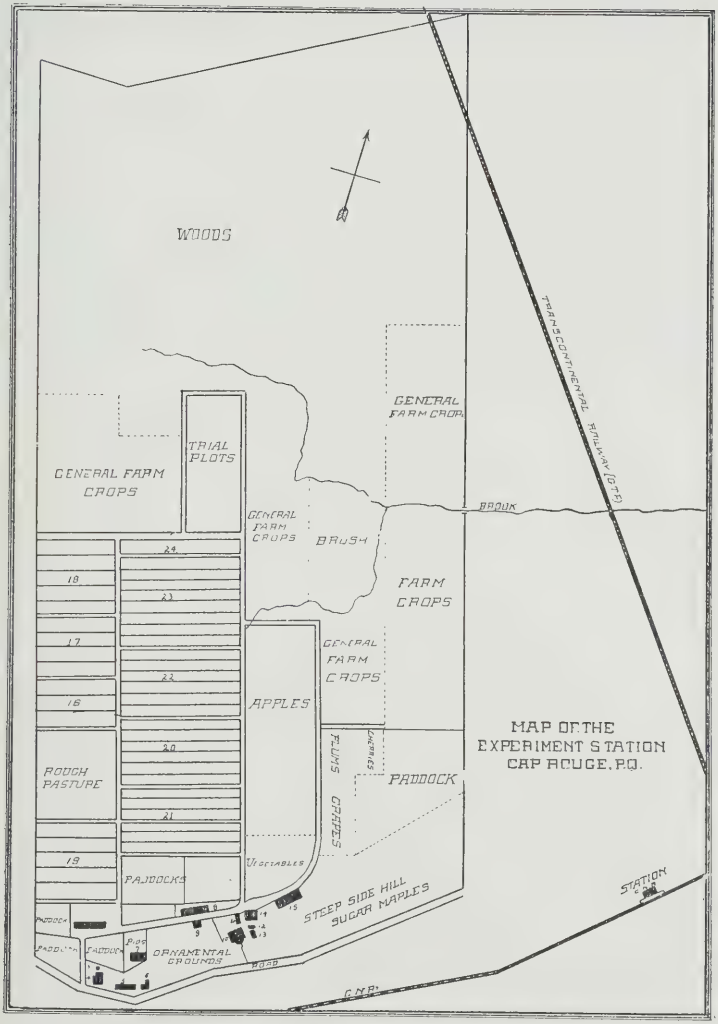
1st year —Hoed crops. 20 tons manure per acre.
2nd year.—Grain.
3rd year.—Hay.
4th year.—Hay.
5th year.—Pasture.
6th year.—Grain.

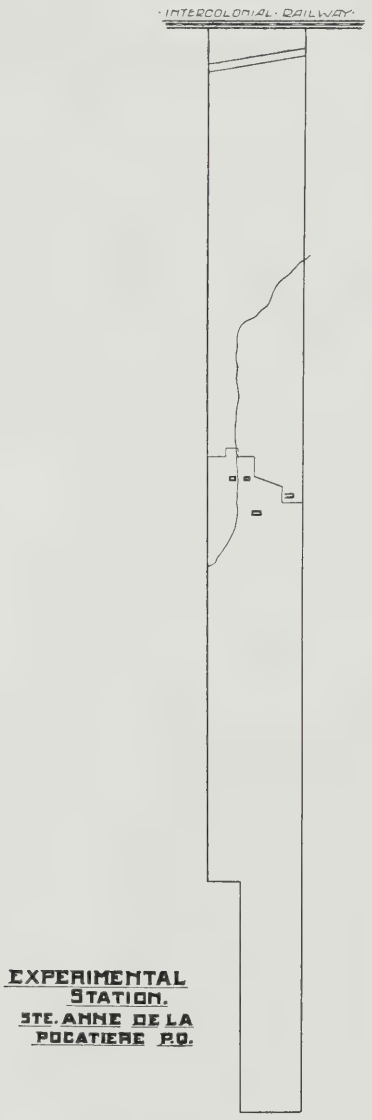
21.—ROTATION "J". COMMENCED 1911.

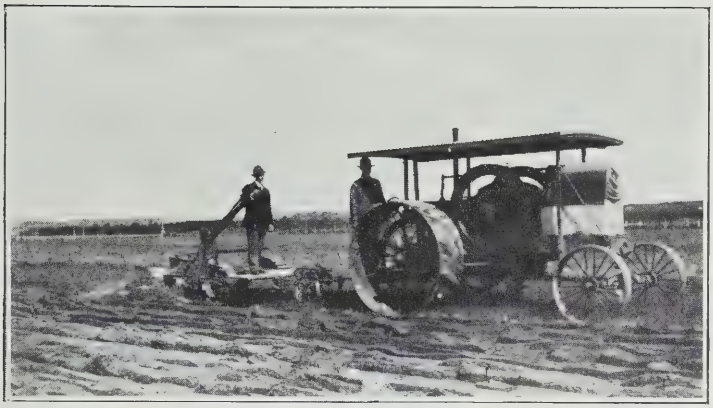
1st year —Hoed crops. 24 tons manure per acre.
2nd year.—Grain.
3rd year.—Hay.
4th year.—Pasture.
5th year.—Grain.
6th year.—Hay.

22.—ROTATION "K". COMMENCED 1911.

1st year.—Hoed crop. 24 tons manure per acre.
2nd year.—Grain.
3rd year.—Hay.
4th year.—Hay.
5th year.—Pasture.
6th year.—Pasture.


WOODS
TRANSCONTINENTAL RAILWAY (G.T.P.)
GENERAL FARM CROPS
TRIAL PLOTS
GENERAL FARM CROPS
BROOK
GENERAL FARM CROPS
BRUSH
FARM CROPS
GENERAL FARM CROPS
APPLES
MAP OF THE EXPERIMENT STATION CAP ROUGE, P.Q.
ROUGH PASTURE
PADDOCK
PADDOCKS
Vegetables
STEEP SIDE HILL SUGAR MAPLES
ORNAMENTAL GROUNDS
ROAD
STATION
C.N.R.


INTERCOLONIAL RAILWAY
EXPERIMENTAL
STATION.
STE. ANNE DE LA
POCATIERE P.Q.



Ploughing by Gasoline.

Corn Harvest, Brandon.

Sheep Feeding at Brandon.
100 in Bunch.

EXPERIMENTAL FARM

FOR

MANITOBA

BRANDON, MAN.

The Experimental Farm for the Province of Manitoba was established at Brandon in 1888. It is located chiefly on Section 27 of Township 10 Range 19, west of the First Meridian, but also contains small portions of sections 22 and 37 of the same Township. Most of the Farm is within the corporation limits of the City of Brandon, the distance being 2½ miles in a north-westerly direction from the business centre to the Experimental Farm buildings. Brandon is reached by the Canadian Pacific, Canadian Northern and Great Northern Railways and expects soon to have a branch of the Grand Trunk Pacific.

The area of the Farm is 652 acres; about two-thirds of this is situated in the Assiniboine Valley. Some 350 acres of the valley land are available for agriculture, the balance being taken up by roads, woods, watercourses and a small lake. The valley soil is a deep, rich, black loam, with a clay subsoil. Part of it has sufficient heavy clay in its composition to make it stiff and tenacious. Part is a lighter loam with a considerable portion of sand in it and is much more friable and easily worked but is more liable to blowing. There is thus, in the valley, land that is typical of most of the better land in Manitoba, both of the heavy clay of the eastern part of the Province and of the lighter land of the western.

The sloping sides of the Assiniboine Valley and the coulèes leading to them take up about 200 acres of the Farm. This land provides good building sites and well-drained yards. Experiments in fruit growing and tree growing are also conducted on the hillside. Otherwise, it is too rough for cultivation and is used only as permanent pasture.

On the higher level, there is rolling prairie land, forty acres of which are cultivated. The soil here is shallow and sandy, and the subsoil is open gravel, which, in some places, comes to the surface. It was intended that this portion of the Farm should be typical of the less fertile parts of the Province, but there is very little land as poor as this under regular cultivation in Manitoba. By systematic rotation, it is found possible to make even this land productive.

Drainage is towards the Assiniboine River which forms the front border of the Farm along its whole width. There is a natural slope towards the river and a few little watercourses

traverse the Farm. From some low spots, that had no natural outlet, open ditches or covered drains have been put in.

Avenues and shelter belts of trees were planted shortly after the Farm was started; these have grown well and now afford great protection from the winds. Together with the natural beauty of the location overlooking the Assiniboine River and the City of Brandon, the trees, shrubs and flowers make the Farm a place of beauty well worth a visit on that account alone.

The experiments under way cover a wide range. In the first place, there are the tests of varieties. These tests, carried on continuously since the Farm started, are made to compare the productiveness, earliness and general suitability of varieties of all kinds of grain crops, grasses, clovers, including alfalfa, Indian corn, roots, potatoes, all kinds of vegetables, fruits, ornamental shrubs and garden flowers. Both standard and new varieties of all these are tested and compared.

Of equal importance is the work of determining the best agricultural methods. Part of this work is done by the rotation experiments. Blocks of land, which in the aggregate take up the major portion of the arable part of the Farm, are set apart to be cultivated under nine different rotations, the cost of production and the revenue from each being carefully kept. In addition, a large number of small plots are set apart for cultural experiments, on which different methods of conducting farm operations are tried and compared. (See Cultural Work and plans of Farm.)

The demonstrating of the value of new crops has always been given special attention. In the earlier days, grasses were introduced and the practicability of growing trees for ornamentation and as wind breaks was shown. At the present time, our crops demonstrate year after year the possibilities of clovers, alfalfa and Indian corn and show that these crops deserve more general adoption by Manitoban farmers.

Experiments with live stock include testing of feeds for fattening steers, pigs and sheep, and also for milk production, the former including the comparison of outside feeding *versus* stabling for the winter fattening of steers and sheep.

Horticulture.

Strawberries are grown on the Farm with great success, the area devoted to them being located in the horticultural grounds in front of the barns. Experiments are made both in methods of cultivation and in winter protection.

Bush fruits do well and yield abundantly. A new plantation of these is now set out, including all the newest and best varieties, some of the older and less successful kinds having been dropped.

Plums of the hardier kinds also do well, most of the plum trees on the Farm being selected strains of the native plum of Manitoba, which varies greatly in size, quality and earliness, some maturing as early as Aug. 15th. A selection called "Major" in particular is a very good strain of native plum. There are also some excellent seedlings of Cheney.

Although more work has been done with apples than with any other fruit, it is impossible, as yet, to claim success with them at this farm. The apple orchard is situated on the higher land north of the Superintendent's house. The first orchards were planted in the enclosures now used for vegetables and fruits. It was thought that the winter-killing of the trees in this location was due to the heavy, rich land which held much moisture and caused late, sappy growth, easily injured by the winter cold. The present location was chosen on light, sandy land, with gravel in the subsoil. The hillside orchard has room for over one thousand trees and is planted almost to its capacity. While winter-killing has not been quite so severe as in the valley, as yet very few standard apples have been grown and, usually, after a standard apple tree bears, it succumbs the following winter. Even with the best varieties of cross-bred apples, the same difficulties have been encountered.

Vegetable Garden.

All the common varieties of garden vegetables, including potatoes, are grown each year. The vegetable garden is situated in front of the barns along with the small fruits.

With onions, carrots, parsnips, turnips, beets, etc., tests are made of the best varieties by planting in rows in the garden. From three to ten varieties of each are grown and the yield, quality and earliness noted. With radishes, lettuce and green peas, sowings are made at different dates so as to prolong the season of use. Celery, cabbages, cauliflower, tomatoes, pumpkins, squash, melons, citrons, cucumbers, etc., are started in a simple hot bed and are then transplanted after the danger of severe frost is past. Several varieties of each of these kinds are tested. With tomatoes, a test is made comparing pruning with leaving the vines unpruned. By pruning severely, we are able to secure a good yield of ripe fruit; the unpruned vines produce a larger yield but do not ripen the fruit. Table corn is always an important part of the garden. By using suitable varieties it is found possible to produce table corn of good quality and have it ready for early use. About ten to twelve varieties are usually tested; the Golden Bantam has proved the best so far.

For an early vegetable, a bed of asparagus is maintained;

it produces an abundant supply when no other fresh vegetables are ready.

In addition to the common vegetables, small lots of other kinds such as wonderberry, peppers, egg-plant, kohl-rabi, Swiss chard, foliage beet, Brussels sprouts, etc., are usually grown.

Flowers.

The flower beds are located in front of and around the Superintendent's house. All, or nearly all, the hardy kinds are grown. Special attention is given to hardy perennials. These plants are especially suited for prairie homes, as they grow and bloom from year to year without fresh planting and with little attention. Annual flowers are also grown and usually they make a fine display in the latter part of the summer. Some are started in hot beds and then transplanted in their permanent locations, others are sown directly where they are to grow. Sweet peas are usually given most space, on account of their suitability for general use. Asters and dahlias are also a striking part of the flower display, and every fall a large number of bulbs are planted for early spring bloom, including tulips, snowdrops, scillas, hyacinths and others.

Live Stock.

A sufficient number of horses are kept to carry on the work of the Farm. No pure-breds are kept, the animals on hand being grade Clydesdales and Percherons and good representatives of their classes.

The principal breed of cattle at the Experimental Farm here is the Dairy Shorthorn. In addition to these, a few beef Shorthorns and Ayrshires are kept. The Dairy Shorthorn herd is largely descended from the best English herds of this breed and some of them have very good milk records. By breeding from the heaviest milkers, the average record of any herd may be greatly increased.

Each fall, one or two carloads of grade steers are purchased and fattened during the winter, experiments being conducted to test the value of different foods for this purpose. Part of the number of steers are fed outside without any shelter but the brush. In this way, a comparison is made between feeding outside and in the stables. The place where the outside steers are fed is located on the hillside north of the sheep barn.

Sheep are a new addition to the stock on this Farm. The first were bought in the fall of 1910, consisting of 25 western range ewes, two pure-bred Oxford Down ewes and one Oxford Down ram. It has been increased by the female progeny of the original flock.

The wether lambs from the flock, together with a number of lambs and sheep purchased, are fattened over winter, being used for experiments in feeding, which operation is carried on in an open yard on the hillside, east of where the outside steers are fed. They have for shelter a cheaply-built shed, with a straw roof, open in front, and boarded on the sides and back.

Two breeds of swine are kept, Yorkshires and Berkshires. The number kept is not very large, usually two or three sows and one stock boar of each breed. The young pigs are mainly used for experimental feeding purposes but some of the best are sold to farmers for breeding. The sows that are suckling and the young pigs are wintered in a comfortable piggery. The boars and dry sows stay outside and shelter in cheap cabins.

In poultry, a few birds of each of three breeds are kept: Barred Plymouth Rock, Buff Orpington and Silver Grey Dorking.

Cultural Work.

Wheat.

Wheat is the principal crop of Manitoba and therefore receives special attention at the Experimental Farm. Since Red Fife is the old, standard variety that has made Manitoba wheat famous, it is the variety most largely grown. There is also a considerable quantity produced of Marquis, a new variety that promises to be of great value to districts that need an early kind. Smaller field lots are grown of other varieties such as White Fife, Preston, and any new kinds that appear promising

Cultivation for Wheat.

The summer-fallow has long been considered in this province to be the best preparation for a crop of wheat. On the Farm, the method of summer-fallowing adopted as most successful is to plough once, in June, as deeply as practicable—at least six inches—to pack the land after ploughing, and then to keep the surface loose and free from weeds by occasional cultivation during the remainder of the summer. After a summer-fallow, two crops of wheat are usually taken in succession. For the second crop, the land is fall-ploughed about six inches deep and packed; a light application of well-rotted manure is found beneficial to a second crop of wheat.

Continued summer-fallowing, while it gives good crops for a long time, must in the end be exhaustive of the fertility of the land and destructive of the vegetable fibre which holds the land in place and prevents blowing. It is therefore desirable that there be found, first, a substitute for summer-fallow that has

its virtues without its faults; secondly, a corrective that will restore to the soil the fertility and vegetable fibre that the summer-fallow has wasted. Both of these have been found and are being used on the Experimental Farm in preparing the land for wheat. Indian corn, with constant tillage between the rows, is found to be a substitute for summer-fallow. It produces almost as good a following crop of wheat and destroys weeds as well, at the same time furnishing a large quantity of fodder which, being returned to the land in the form of manure, keeps up the fertility. Leguminous forage crops such as clover and alfalfa, are also found to be a corrective for the faults of the summer-fallow. By their peculiar power of drawing nitrogen from the air and storing it in the soil, they renew the lost fertility and their fibrous roots, in decaying, return the vegetable fibre and prevent the land from blowing. These crops are therefore displacing, to a considerable extent, the summer-fallow as a preparation for wheat.

Oats, one of the main field crops on the Farm, are grown chiefly for feeding, the Banner being the variety forming the bulk of the crop. Variety tests are also carried on of such sorts as appear promising.

Barley is also grown mainly for feeding purposes and is found excellent for fattening stock. The varieties grown most largely are Mensury, Manchurian and O. A. C. No. 21, all six-rowed.

Peas are a crop that deserve to be more widely grown; they yield well and are very valuable both for food and for their enriching effect on the land. The variety chiefly grown here in field lots is the Arthur.

A limited quantity of flax is grown each year, usually on sod land.

Indian corn for ensilage is one of the most highly valued crops on the Farm. Not only is it of great value as a substitute for summer-fallow in a rotation, but it produces a greater bulk of good feed per acre than any other crop we can grow. The Northwestern Dent is the variety chiefly sown here, as it is a very early sort, well suited to our conditions. The corn is planted either on land that has grown grain for two or three years and needs summer-fallowing or else on sod land. In either case, manure is applied and ploughed in. The corn is planted about May 25th to June 1st, and is kept cultivated throughout the summer. It is cut about Sept. 5th to the 10th, and is stored in the silo. The ensilage makes a fresh succulent feed during the winter and is much enjoyed by the cattle.

Mangels and turnips are both grown for winter feeding, the mangels being fed to the milch cows, pigs and poultry and the turnips to the young cattle, steers and sheep. A few carrots are

grown and fed to the horses. Potatoes are also grown in sufficient quantities for table use.

Red Clover is very largely used as a hay crop, and alsike is also sown, though not so extensively, on low, moist ground. Clover is a crop that has been found to be very valuable both in its beneficial effect on the land and in its great feeding qualities. Red Clover is a biennial and is therefore used in short rotations where the sod is ploughed up again soon. It is sown without or with a nurse crop, for which barley, oats and peas are all used, the first appearing to be the best. The following are among the mixtures used on this Farm:—

1st.—Timothy, 3 lbs., Western Rye Grass, 5 lbs., Red Clover, 8 lbs., per acre. 2nd.—Timothy, 5 lbs., Red Clover, 8 lbs. per acre. 3rd.—Western Rye Grass, 8 lbs., Red Clover, 6 lbs., Alsike, 2 lbs., per acre. 4th.—Timothy, 5 lbs., Red Top, 3 lbs., Alsike, 4 lbs. per acre.

Alfalfa is the heaviest yielding hay crop on the Farm; it takes longer to get to its best than does clover, and requires to be sown without a nurse crop. Once established, it produces two heavy crops of hay each season and lasts for many years. Grimm's, Turkestan and Common are the varieties grown.

Rotations.

In the part of the Farm set aside for experiments in rotations (see map), the land set aside for each is divided into as many fields as there are years in the rotation, and each field has each crop in the order of the rotation. The fields are numbered in the opposite direction to the sequence of the crops, so that the crop that is on field No. 1 this year will be on field No. 2 next year. An account is kept of the receipts and expenditures in connection with each, so that the results show which of the systems of farming, as represented by the different rotations, is the most profitable. Chemical analyses made of the soil on the rotation check plots, of which there is one to represent each rotation, will show which conserves best the fertility of the soil.

A. Wheat continuously. (Used only in the $\frac{1}{2}$-acre check plot).

D. 1st year.—Wheat (manure in fall).
2nd year—Wheat.
3rd year.—Oats.
4th year.—Summer-fallow.

E. 1st year.—Wheat (no manure).
2nd year.—Wheat.
3rd year.—Oats.
4th year.—Summer-fallow.

F. 1st year.—Wheat.
2nd year.—Wheat (manure in fall).
3rd year.—Corn or roots.
4th year.—Oats and barley (seeded with grass and clover.)
5th year.—Clover hay.

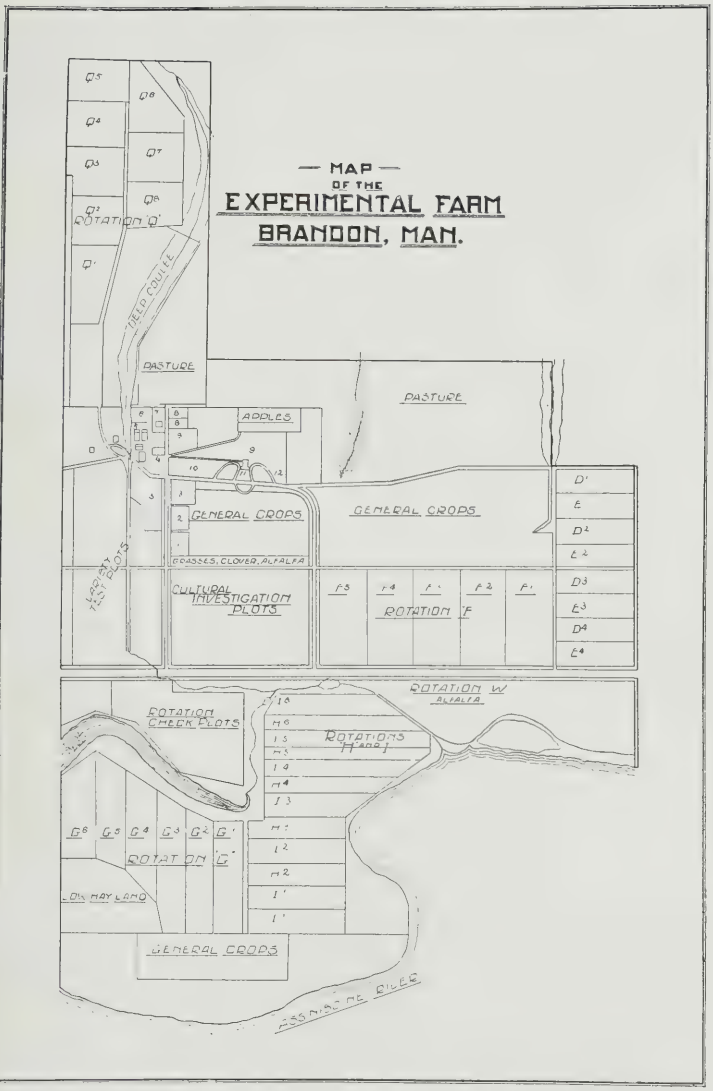
G. 1st year.—Wheat.
2nd year.—Wheat.
3rd year.—Oats or barley (seeded with grass and clover).
4th year.—Clover hay.
5th year.—Pasture (manure in fall).
6th year.—Corn or roots.

H. 1st year.—Wheat.
2nd year.—Wheat.
3rd year.—Summer-fallow.
4th year.—Oats (seeded with grass and clover).
5th year.—Clover hay.
6th year.—Pasture (manure in fall).

I. 1st year.—Flax.
2nd year.—Oats.
3rd year.—Summer-fallow.
4th year.—Wheat (seeded with grass and clover).
5th year.—Clover hay.
6th year.—Pasture (manure in fall).

Q. For sheep farm on light hill land.
1st year.—Roots and peas.
2nd year.—Wheat and oats (seeded with grass and clover).
3rd year.—Hay.
4th year.—Hay.
5th year.—Pasture.
6th year.—Pasture.
7th year.—Pasture.
8th year.—Green feed and rape (manure in fall).

W. 1st year.—Wheat.
2nd year.—Wheat (manure in fall).
3rd year.—Corn or roots.
4th year.—Oats.
5th year.—Barley.
6th year.—Alfalfa (seeded alone).
7th year.—Alfalfa.
8th year.—Alfalfa.
9th year.—Alfalfa.
10th year.—Alfalfa (ploughed up in midsummer).



KEY TO BRANDON MAP.

1—Plums.
2—Fruit.
3—Vegetables.
4—Barn.
5—Poultry.
6—Piggery and Runs.
7—Sheep.
8—Paddocks.
9—Trees.
11—Residence.
12—Shrubs.
13—Flowers.

EXPERIMENTAL FARM

FOR

SOUTHERN SASKATCHEWAN,

INDIAN HEAD, SASK.

The Experimental Farm at Indian Head consists of some 680 acres, comprising Section 19, Township 18, Range 12, west of the 2nd Meridian and 42 acres of the adjoining section to the south. The farm lies one half-mile east of the centre of the town of Indian Head, on the main line of the C.P.R. It is 44 miles east of Regina, the capital of Saskatchewan, 108 miles north of the United States boundary, and 103 miles west of the boundary of Manitoba. It was purchased in 1887 and experimental work began in 1888.

The southern part of the farm consists of a sandy loam, while the northern portion is a clayey soil, with a clay subsoil underlying all. Two creeks run through the farm, one entering on the south and the other on the west. Both pass out on the north and join the Qu'Appelle River a few miles away. These creeks and their ravines afford good drainage to the entire farm and at the same time, add to its appearance The water from these streams, though more or less alkaline, was for some years the source of supply for the needs of the farm, which is now, however, connected with the water system of the town of Indian Head.

The present Superintendent, Mr. Angus Mackay, was appointed in 1887 and has had charge since that time.

The twenty-four years since the establishing of the farm at Indian Head has seen the West develop and change from an unsettled country, with nothing known of its agricultural possibilities beyond the fact that first-class wheat could be grown, when not destroyed by frost, to a country rapidly filling with the best class of settlers, traversed by transcontinental railroads and their branches and with all the comforts and resources of civilization at its doors. The work of the Experimental Farm has expanded with the growing needs and possibilities of the country; it may with justice be said to have led the way in providing for the increasing complexity of the demands on the agricultural resources of the West by careful and persistent experimenting along many lines.

The obtaining of early varieties was obviously of prime importance in a country which depended then entirely, and still does to a great extent, on its wheat crop for revenue. The varieties which were successful in the East were in great danger from frost each year in Saskatchewan. Marked success has been achieved in the production of early varieties of wheat, and this branch of the work has not been confined to that cereal alone, but has gradually been extended to most of the other varieties of field and garden crops where the necessity for earliness in maturing exists.

The evil effects of constant grain growing were early foreseen, and systems of rotation which would keep up fertility, prevent the land becoming overrun with weeds, afford a comparison between the value of summer-fallow and the ploughing under of leguminous crops and, at the same time, by giving the farmer a wider range of products, afford him a better opportunity of having at least one good crop in almost any year, were commenced in 1899 and carried on until 1909, on half-acre plots. This work is now being continued on a much larger scale. (See Plan.)

An elaborate system of cultural experiments is also in progress, to test the advantages of various methods of soil treatment, fertilization and methods of cultivation. This work is under the immediate charge of the Superintendent's Assistant. (See plan for details of Cultural Plots.)

The best time and methods of breaking new land on the prairie have been thoroughly worked out and the experience obtained has proved of the greatest value to the new settler. These results have been published in pamphlet form under the title of Preparing Land for Grain Crops in Saskatchewan.

In connection with all cultural operations in this district, the problem of conservation of moisture must be taken into account. For the past twenty-one years, the average rainfall during the six months of growth, April to October, has been 12·93 inches, showing the necessity of preserving this moisture in the soil as long as possible by suitable methods of cultivation, applied at the proper season, if the crops are to have sufficient for good growth.

The testing of varieties of cereals, roots, grasses and clovers, including alfalfa, and of flowers, trees and shrubs has been carried on continuously since the farm was established. Varieties which have proved inferior have been discarded from time to time; others, after some years of partial failure became acclimatized, and are now grown with almost uniform success.

The development of varieties of garden and orchard fruits and of ornamental trees and shrubs suitable to the prairie country has always been one of the chief aims of this farm. When the

An Avenue at Indian Head.

Bunch of Ewes at Indian Head.

work was started in 1888, some twenty-three thousand trees and plants were set out. These were mostly forest and ornamental trees, but included over three thousand specimens of fruit-bearing sorts. The varieties first planted were, however, unsuited to the West; many died during the first winter, others succumbed to the effects of the hot, drying winds of the summer following and it was not until 1892 that much progress was made along this line. In that year, thick windbreaks of Manitoba maple (*Acer negundo*), were planted around the north and west sides of the farm and as soon as these had become large enough to provide shelter, they were found to aid greatly in the acclimitization of many varieties which had formerly proved too tender to resist the sweeping prairie winds. There are now some 100,000 ornamental trees and shrubs on the Experimental Farm, in avenues, shelter belts and groups. These represent about forty species and over two hundred varieties. When the farm was established, not a tree or bush was visible to a person standing at the centre of the area purchased for experimental work. The contrast is a striking one and the example of what time, patience and correct methods can do, must, during the quarter-century of the farm's existence, have stimulated many a settler to beautify the surroundings of his new home on the prairie.

In 1896, a variety of Russian Crab Apple (*Pyrus baccata*) was obtained and proved to be very hardy, but its fruit was small. By crossing with some of the standard varieties of apple, which themselves were too tender to stand the climate of Saskatchewan, several promising varieties suitable for the west have been produced. Considerable attention has also been given to plums and several kinds are now grown with fair success. There are at present about 1,500 fruit trees on the Farm.

Besides the tree fruits, seventy varieties of currants are grown, as well as seventeen sorts of raspberries, twenty of gooseberries and two of strawberries.

Vegetables of all sorts, including potatoes, have been extensively tested year after year and seldom fail to give satisfactory returns, although occasionally tomatoes and beans suffer from early frosts.

The live stock and dairying industries have been slow of growth in Saskatchewan, due to several causes. Nothing was known of the possibility of growing the different kinds of rough fodder required. The introduction of various sorts of hardy grasses, the proof that clovers, including alfalfa, Indian corn for ensilage, roots, etc., could be profitably grown, rested with the Experimental Farm and has been successfully performed.

The prairie country was regarded by the early settlers from the one point of view, as a producer of No. 1 wheat, and the

necessity for more diversified farming, including the keeping of live stock, if the fertility of the soil were to be maintained, had not yet been considered.

Most of the settlers were men of very limited capital. For live stock, expensive buildings and equipment were required. There was also the question of the marketing of the product. The local demand was, as yet, very small, and the limited transportation facilities of the earlier days made the shipment of stock and dairy products to a distant market difficult, if not impossible.

Conditions in all these respects have changed and are every day rapidly improving. Capital is more easily obtained. Railway facilities are available in the greater part of the province and new lines are constantly being opened up. The importance of "mixed" farming, in order to preserve the fertility of the soil is also becoming apparent, so that the raising of both beef and dairy cattle is likely to assume much greater prominence in the near future than it has held in the past.

Since the establishment of the Farm, a herd of beef cattle has been kept, and very satisfactory results obtained. The Shorthorn is the breed kept at present, the herd consisting of both pure-bred and grade animals.

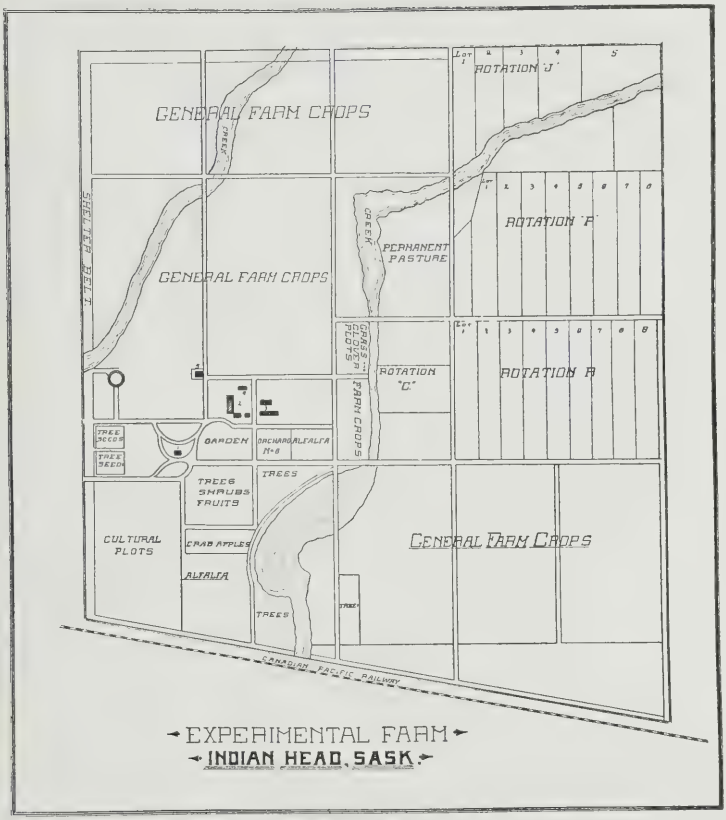
Experimental feeding of steers is carried on each year, the Farm-bred steers available for this purpose being supplemented by enough purchased animals to use up much of the roughage produced. An accurate account of receipts and expenditures in each experiment is kept and the possibility of the profitable fattening of cattle has been demonstrated.

Two breeds of swine are at present kept, Yorkshires and Berkshires. Animals suitable for breeding purposes are sold to farmers throughout the Province for the improvement of their stock and the remainder are used for experimental feeding.

Experimental work with sheep has been recently started with a view to demonstrating the possibility of profits in this industry, which has been but little followed in the Northwest. Experimental feeding of lambs is carried on, with different rations and under varying conditions as to shelter. Work is also being carried on to ascertain what can be done towards improving a flock of grade ewes, such as most farmers in the district would be likely to start with, by the use of a pure-bred ram.

No experimental work has been carried on so far with horses, those at the Farm being used as work animals exclusively.

Two breeds of poultry are kept, the Barred Plymouth Rock and the Black Minorca. Young stock and eggs for hatching are sold. Interest in the poultry industry in Saskatchewan has been lessened in the past by the demands for the solution of other


GENERAL FARM CROPS
TREES
SHELTER BELT
GENERAL FARM CROPS
CREEK
PERMANENT PASTURE
CROP PLOTS
ROTATION "C"
FARM CROPS
ROTATION "J"
ROTATION "F"
ROTATION "B"
TREE SEEDS
TREE SEEDS
GARDEN
ORCHARD ALFALFA
TREES SHRUBS FRUITS
CULTURAL PLOTS
CRAB APPLES
ALFALFA
TREES
TREES
GENERAL FARM CROPS
CANADIAN PACIFIC RAILWAY
EXPERIMENTAL FARM
INDIAN HEAD, SASK.

agricultural problems, but, as these are cleared away, the indications are for the rapid growth of poultry keeping in the near future.

Detail of Rotations as Indicated in the Plan of the Experimental Farm at Indian Head, Sask.

ROTATION "J". COMMENCED 1912.

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat or coarse grain.
4th year.—Oats seeded down to rye grass, clover and alfalfa.
5th year.—Hay.
6th year.—Pasture.

ROTATION "P". COMMENCED 1911.

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat.
4th year.—Summer-fallow.
5th year.—Roots or legumes, manure 15 tons per acre.
6th year.—Barley seeded down to rye grass, red clover, alfalfa.
7th year.—Hay.
8th year.—Pasture.

ROTATION "R". COMMENCED 1910.

1st year.—Summer-fallow.
2nd year.—Hoed crop or legumes, manure 15 tons per acre.
3rd year.—Wheat.
4th year.—Oats.
5th year.—Summer-fallow.
6th year.—Wheat.
7th year.—Oats seeded down to rye grass, red clover and alfalfa.
8th year.—Hay.
9th year.—Pasture.

EXPERIMENTAL STATION

FOR

CENTRAL SASKATCHEWAN

ROSTHERN, SASK.

The land now forming the Experimental Station at Rosthern had been owned by the Hudson's Bay Co. until 1898, and was held by private owners until 1908, when it was purchased by the Dominion Government. For the previous ten years, it had been continuously cropped to grain, the injurious effects of which are seen in the trouble since encountered with dust storms and weeds. The equipment of horses and implements was purchased in the spring of 1909 and, in April of the same year, the present Superintendent was appointed and took charge.

In 1909, the whole Farm was summer-fallowed and the Superintendent's house and the implement shed were built.

Experimental work was attempted in 1910, but the season was dry, the winds high and frequent and late frosts in May injured the crops. This combination of adverse conditions acting upon a soil not yet recovered from the constant crop production of the previous decade, resulted in very little being accomplished. Experimental work was really begun in 1911.

The Station comprises nearly all of the N.W. $\frac{1}{4}$, Sec. 26, Tp. 42, R. 3, west of the Third Meridian. Nearly six acres are cut off by the Canadian Northern Railway and a slough infringes on the south, leaving one hundred and fifty-one and one-quarter acres in the farm.

It is situated on the east of and adjoining the Canadian Northern Railway, one half mile south of the town of Rosthern, and, being slightly elevated above the surrounding country, commands an extensive view. Being but half a mile from the depot, post office and the centre of the town, it is easy of access to visitors, whether walking or driving.

The soil is a deep black loam, somewhat sandy, overlying about a foot of almost impervious clay, below which is sand almost coarse enough for building purposes, but as a greater depth is reached, the sand becomes finer and finer until at twenty feet no further digging can be done, as quicksand is encountered. The land is very level and the soil seems to be very uniform and well adapted for experimental purposes.

The north-east quarter of the farm is devoted to what is termed uniform trial plots. It is divided into ranges extending east and west, 78 feet in width with 16-foot roads between. These ranges are subdivided into plots 14 feet wide with 4-foot paths between. The soil on one range is treated as uniformly as possible throughout its length. Different varieties of one kind of crop are grown on one range and different kinds of crops on different ranges. Thus, in 1911, all the wheats were grown on Range 1, the oats on Range II, the barleys on Range III, the peas on Range IV, and the different varieties of corn and roots on Range V.

The conditions of soil and cultivation being uniform throughout a range, it is reasonable to suppose that a comparison of the yields of the different wheats grown on the plots on one range is a fair estimate of a comparison of the yielding qualities of the varieties under test. So with the other crops in the other ranges.

In these experiments, the land that was in crop in 1911 will be summer-fallowed in 1912 and the plots of 1912 will be on land that was summer-fallowed in 1911. They are spoken of as the Uniform Variety Tests and the plots are referred to as the Uniform Trial Plots. The section devoted to these is indicated on the plan of the farm.

A very complete set of cultural and rotation tests has also been commenced but they have not yet been carried on for a sufficient length of time to permit of reliable conclusions being drawn from them.

Horticulture.

To the south-west of the Superintendent's residence is about three acres devoted to growing apples and plums and to the east of the house is the plantation of small fruits, including gooseberries, raspberries, currants and strawberries.

There are about six hundred apple trees, planted fifteen feet apart both ways, and they include many of the standard varieties as well as a number of cross-breds from the hardy Russian varieties imported by Dr. Wm. Saunders a number of years ago. They have withstood two winters successfully.

There are about sixty plum trees, a few of which are standard varieties, but most of which were obtained from German settlers who brought with them the native plum of Manitoba when they migrated from that Province.

Both the apple and the plum orchards are cultivated during the summer until early in August, when the ground is sown to rape at the rate of 4 lbs. per acre. This attains a height of about 15 inches by the time the snow comes, with which it is filled, affording an excellent protection to the tree roots.

The bush fruits were planted in the spring of 1911, in rows six feet apart, with the gooseberries and currants five feet apart in the row and the raspberries three feet. These plants, while small, have strawberries planted between the rows. The latter will be ploughed up in 1913.

There was no shelter belt large enough to be a protection to the bush fruit plantation when the fruits were planted and, in order to catch the snow, sunflower seed was sown in rows alternately with the bush fruits and strawberries, early in June. These attained a height of about three feet when the frost came. Being still green and immature, the leaves remained on throughout the winter and the heads were not heavy enough to break the stalks. Consequently, they served as a most efficient shelter.

Vegetable Garden and Flowers.

The only protected place on the Station is a spot immediately south of the men's boarding house, 120 feet by 380 feet, and in this was planted part of the vegetable garden in 1911. The protection is a hedge of maples about 12 feet high, quite open in spots, but, nevertheless, of sufficient density to check the wind considerably, thereby allowing cabbage, lettuce, cauliflower, onions and many other vegetables, which failed to grow in the open the year previous, to make luxuriant growth. Although the space was small, it was the admiration of all who saw it at any time during that season.

There is not yet a sufficiently protected place for a flower garden, but a successful attempt was made at growing a bed of thirteen hundred tulips at the south side of the Superintendent's house. When these finished blooming, the bed was planted with a few annuals.

On the east, west and north sides of the farm are two rows of trees and a row of shrubs, planted in 1909, those dying having been replaced in the years following. The shrubs particularly are beginning to make a fine appearance. In addition to improving the looks of the farm, they will form a good shelter belt.

On the west and north sides of the house, on both sides of the driveway, are groups of many varieties of shrubs and about an acre of lawn to be bordered with flowers. There is also a lawn north of the men's boarding house.

Live Stock.

Two grade dairy cows, five work horses and a driving horse at present constitute the live stock of the Station.

Roads.

The roads on the farm are all graded and those not in constant use are sown to rye grass. The grading was done by means of a plough and a split-log drag. With these implements, a man can complete a half-mile of road in two days.

Detail of Rotations as Indicated on the Map of the Experimental Station at Rosthern, Sask.

Rotation "C."

1st year.—Wheat.
2nd year.—Wheat.
3rd year.—Summer-fallow.

Rotation "J."

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat or coarse grain.
4th year.—Oats seeded down to rye grass, red clover and alfalfa.
5th year.—Hay.
6th year.—Pasture.

Rotation "R."

1st year.—Summer-fallow.
2nd year.—Hoed crop or legumes. Manure, 15 tons per acre.
3rd year.—Wheat.
4th year.—Oats.
5th year.—Summer-fallow.
6th year.—Wheat.
7th year.—Oats seeded down to rye grass, red clover and alfalfa.
8th year.—Hay.
9th year.—Pasture.

Rotation "P."

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat.
4th year.—Summer-fallow.
5th year.—Roots or legumes. Manure, 15 tons per acre.
6th year.—Barley seeded down to rye grass, red clover and alfalfa.
7th year.—Hay.
8th year.—Pasture.

ROTATIONS "R," "J," "P," "C."

Dominion Chemist's Check Rotations.

PLOT 1.

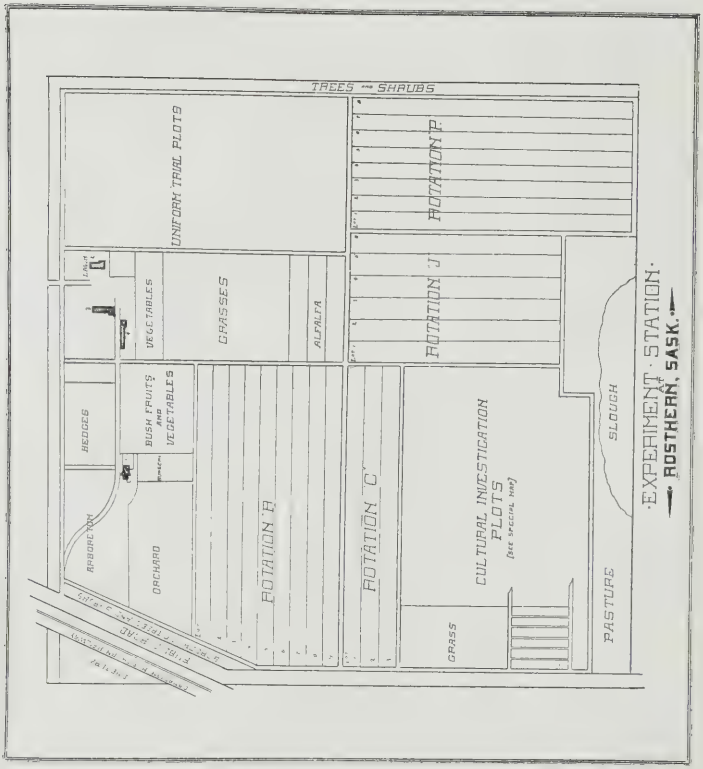
Grain and fallow alternately.

PLOT 2.

Grain continuously.

BUILDINGS AS NUMBERED ON PLAN.

1—Residence.
2—Boarding house.
3—Stable and shop.
4—Implement shed.


TREES and SHRUBS
UNIFORM TRIAL PLOTS
ROTATION P
ROTATION J
GRASSES
ALFALFA
VEGETABLES
BUSH FRUITS AND VEGETABLES
HEDGES
ARBORETUM
ORCHARD
ROTATION A
ROTATION C
CULTURAL INVESTIGATION PLOTS
(SEE SPECIAL MAP)
GRASS
PASTURE
SLOUGH
EXPERIMENT STATION
ROSTHERN, SASK.

Line-up of Horses, Scott.

Plot Threshing at Rosthern.

Farm House and Outbuildings, Lethbridge.

EXPERIMENTAL STATION

FOR

NORTHERN SASKATCHEWAN,

SCOTT, SASK.

This farm is made of the N. E. quarter of Section 17 and that portion of the S. E. quarter of Section 20 lying south of the Grand Trunk Pacific, of township 39, Range 20, west of the Third Meridian. The Station is located on the main line of the above-mentioned road, and adjoins the townsite of Scott on the north and east.

The land for the Experimental Station was purchased by the Dominion Government in the spring of 1910, and consists of 198½ acres of average land, representative of a large section of this part of Saskatchewan. The soil is a chocolate-coloured clay loam, with a clay subsoil, rich in vegetable matter. There is good natural drainage, the land sloping towards a depression running throughout the farm.

In the summer of 1910, 105 acres were broken, and during the fall and winter following, a barn and a residence for the Superintendent were erected. In the spring of 1911, experimental work was begun.

Four rotations (see plan) were started in that year, one of nine years' duration, one of eight, a third of six, and a fourth of three years, with the view of obtaining data as to the most profitable rotation to adopt, while still maintaining the fertility of the soil.

In the cultural investigation work, a beginning was made in 1911, with Experiment No. 5, containing fifty-five plots and extending over five years. The remaining experiments in the series are being put into operation as fast as possible.

In addition to the rotation and cultural work, variety tests are conducted each year with cereals, roots, vegetables, fruits, flowers, trees and shrubs to ascertain the best sorts for the climate and soil of northern Saskatchewan.

Forty-two varieties of apples were set out the first year, 1911, seventeen varieties of plums, and a number of sorts of small fruits. Considerable work was also done in setting out hedges and trees for ornamental and protective purposes.

Most of the ordinary kinds of garden vegetables do well here, even when sown in the open. Many varieties of flowers,

such as Alyssum, Calendula, Marigolds, Eschscholtzia, Mignonette, Poppies and Pansies, have been tried with success, the bloom continuing in the autumn even after several degrees of frost have been registered.

Experimental work with cattle is only beginning at this Station, attention having first been given to getting the land into proper shape for crop production, both in the experimental plots and in the fields. It is intended to take up live stock work as rapidly as opportunity permits.

Seven work horses are at present on the Station; they are of the Clydesdale breed, and it is planned to raise colts from the mares as well as use them for working purposes.

Detail of Rotations as Indicated in Map of Experimental Station at Scott, Sask.

Rotation "R," commenced 1911.

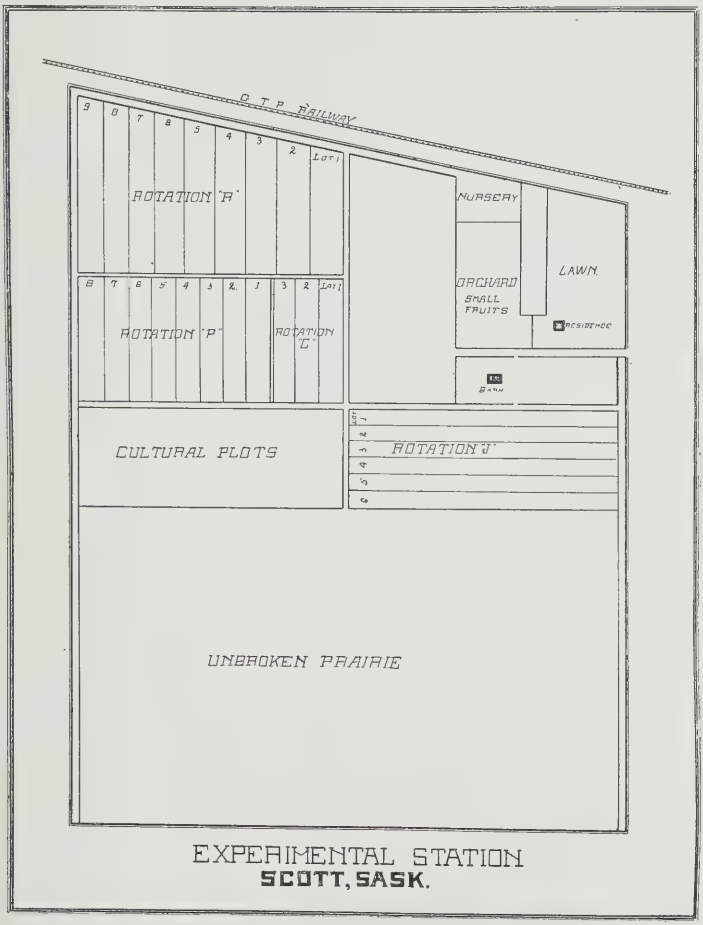
1st year.—Summer-fallow.
2nd year.—Hoed crop or legumes. Manure 15 tons per acre.
3rd year.—Wheat.
4th year.—Oats.
5th year.—Summer-fallow.
6th year.—Wheat.
' th year.—Oats seeded down (rye grass, red clover, alfalfa).
8th year.—Hay.
9th year.—Pasture.

Rotation "P," commenced 1911.

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat.
4th year.—Summer-fallow.
5th year.—Roots or legumes. Manure 15 tons per acre.
6th year.—Barley seeded down (rye grass, red clover, alfalfa).
7th year.—Hay.
8th year.—Pasture.

Rotation "C," commenced 1911.

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat or coarse grains.



EXPERIMENTAL STATION
SCOTT, SASK.

ROTATION "J," COMMENCED 1911.

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat or coarse grain.
4th year.—Oats (seeded down, rye grass, red clover, alfalfa)
5th year.—Hay.
6th year.—Pasture.

Station Barn, Scott.

Alfalfa Field, Lacombe.
Grimm alfalfa on left, Montana on right.

EXPERIMENTAL STATION

FOR

CENTRAL ALBERTA,

LACOMBE, ALTA.

The Experimental Station for Central Alberta was established at Lacombe in March, 1907. The town of Lacombe is located about 115 miles north of Calgary and about 80 miles south of Edmonton on the Calgary and Edmonton Branch of the Canadian Pacific Railway. This Company is extending a line east from Lacombe which is completed at present to Coronation. This line will eventually be connected up with Outlook, Moose Jaw and the East. The Canadian Northern Railway is now constructing a line from Edmonton to Calgary which passes through Lacombe, near which town it also connects with the Brazeau line of that road. Railway accommodation of this kind places the Lacombe Experimental Station within easy reach of many farmers whose problems it is intended to be of some assistance in solving.

The land, some 490 acres in all, is the south-east and south-west quarters of section twenty-four (24) and the north-west quarter and a small part of the north-east quarter of section 13 township forty (40) range twenty-seven (27) west of the fourth (4) meridian and adjoins the Lacombe townsite on the south-west. The Experimental Station is only about one mile from the stations on both lines of railway and but two blocks farther from the post office.

Being traversed by both the Calgary and Edmonton Railway and the Calgary and Edmonton trail, the right of way of these lines of traffic, while offering to travellers a splendid view of the work under way, curtails, by about ten acres, the area of the quarter-section otherwise available for experimental work.

The soil is fairly uniform in character, being a rich black loam on clay subsoil, except over the elevation where the buildings are located, which is sandy loam. The surface soil varies in depth from one foot to four feet or even more, while the clay sub-soil runs at east thirty-three feet, which is the depth of the deepest well on the Station. A part of the Station had been under grain crop continuously for fifteen years previous to its acquisition by the Dominion Government and, not having been

under rotation, the vegetable fibre had been exhausted to a great extent. As a result, the lighter soil on the higher land has shown a tendency to blow. This is being gradually checked by following a rotation of crops including hay and pasture.

In 1907, work was commenced to determine what varieties of cereals, potatoes, roots, vegetables, large and small fruits, trees, shrubs and flowers are best suited to conditions of soil and climate as represented by this Station. Cultural experiments are being conducted in order to satisfactorily answer questions as to treatment of soil under all conditions which would ordinarily arise in the growing of crops. Full data with regard to the cost of producing crops under each of the different rotations outlined are being kept. Within a few years, the suitability of any given rotation both with regard to the cost of crops in manual and horse labour, land rental, manure, machinery depreciation and also its cost in soil fertility will be established. A check plot for each rotation located in virgin soil, from which soil samples were taken before a crop was grown, will reveal through succeeding analyses the effect of each system upon soil fertility. Thus will be possible a two-fold answer to the question, "What does a bushel of grain cost under any given system being tried"?

An opportunity to test out the efficiency of any system for the eradication of weeds is offered through the selection of this particular farm. The means used, such as sowing clean seed, harrowing after grain is up, discing after binder, are beginning to reduce weed seeds, which constituted one-third by weight of the total grain threshed on the Station in 1907.

The annual precipitation averages about 15 inches but, on account of the storehouse for moisture afforded by a soil rich in humus to great depths, this is held for the use of plants and since the Station was established, has been ample, even in driest years, to bring heavy crops to perfect maturity. We find such a soil capable of carrying to maturity more plants to the square foot than could be carried on lighter soil with equal or greater rainfall and, consequently, heavier seeding is advised than is practised in the States immediately south with similar precipitation records.

Horticulture.

In 1908, a beginning was made in the planting of a permanent orchard of apples and plums. The location selected for the site of the orchard, though exposed to the north and north-west winds, has the advantage of a westerly slope, a natural drainage and a soil more of a sandy loam than a clay loam. The years will provide protection through the growth of the shelter belt.

About 600 apple and plum trees have been planted, covering a range of some 125 varieties. Many of these are proving tender

but, on the other hand, many varieties are likely to prove a success. Certain cross-bred apples produced blossoms and fruit set in 1911. The fruit was blown off and did not come to maturity. Among the varieties likely to succeed are Hibernal, Charlamoff, Duchess and Dr. Saunder's hybrids.

Over 100 varieties of strawberries, raspberries, currants and blackberries have been grown. It is a little early to pronounce definitely as to whether blackberries and gooseberries will succeed. Up to the present, results have been disappointing, but shelter is fast growing and greater success is expected. The red raspberries are succeeding; Sunbeam, Early King and Herbert are leading. Red, white and black currants will succeed. The last have done particularly well; one variety, Beauty, yielded in the season of 1911 at the rate of 6,150.8 lbs. and brought 15 cts. per lb. or at the rate of $922.62 per acre.

Vegetable Garden and Flowers.

The vegetable garden includes tests with about 150 varieties. These are grown in rows of uniform length and hence are comparable when weighed as to yield of different varieties of the same class or as between kinds. Celery, cauliflower, cabbage, carrots, beets, turnips and all vegetables of this class, succeed. Cutworms give trouble occasionally. Bran 50 lbs., Paris green 1 lb., moistened and mixed and sprinkled beside the rows is effective in checking this pest.

In no country can pansies, sweet william and other easily-cultivated flowers be grown to better advantage. Attention to the planting will provide bloom without great subsequent care. Over 200 varieties of annuals, biennials, and perennials are being grown. Different varieties of irises and roses are among the most important of the perennials.

Success is attending the trial of hardy shrubs and trees for ornamental purposes. Cotoneasters, spireas, loniceras and syringas do well, while Rocky Mountain blue spruce, Black Hill spruce, white spruce, ash and elm have shown their adaptability to local conditions.

Cultural Work.

The cultivation of land where precipitation falls below 16 inches per annum, on an average over a number of years, must present problems of a very different kind from those arising where precipitation is double that amount. The reason summer-fallow does not enter more frequently into our system is that this moisture falls, for the most part, during the growing season and that the soil is well equipped for holding moisture. The humus that so fortunately holds moisture tends also to hold the

Steer Feeding in the open, Lacombe.

soil open and loose after ploughing. We have found that the use of the surface packer after the plough and again after the seed drill will give big returns. Packing after the drill costs about 25 cents per acre and, in an average of 28 experiments, has resulted in increasing the value of the crop by $2.97 per acre.

Harrowing after the grain is up has given good results in two ways; first by decreasing weeds, second by increasing crops. As a means of weed control and also as a factor in moisture conservation, discing behind the binder has been found effective.

Spring wheat has been found to be less suitable to this climate than is winter wheat, taking one year with another. Winter wheat has given best results sown about the middle of August on breaking at the rate of about $1\frac{1}{4}$ bushels per acre. The Kharkof strain of Turkey Red has given the largest returns. Of the spring wheats, Marquis and Huron are among the best varieties for the brush country or in all districts where early maturity is desirable. Apart from the fact that Marquis is early, it is also a good yielder and stands equal to any variety in the final test of all milling wheats—their baking qualities.

Oats give remarkable yields in this climate, the highest point so far reached being a yield of 156 bus. 2 lbs. per acre of Banner in 1910. In 1911, twenty-one varieties in test plots averaged 106 bus. 10 lbs. per acre. Among the varieties recommended are Banner, Abundance, Ligowo and Gold Rain.

Barley has never failed to mature when sown in season and in addition has never failed to give a paying crop. Mensury, Mansfield and O. A. C. No. 21 are yielding well among the six-row sorts, while Invincible is one of the best two-row varieties.

"Why run a rotation of crops and above all things why apply manure to land already so fertile," is a question frequently heard. In answer: The land, though rich, will eventually revolt against continued cropping without the return of fertilizer and will retaliate by allowing the farmer to expend seed and labour without realizing a profit. A second good reason for the application of farm-yard manure to the land is that we find there is immediate profit in it as well. In 1909, twenty tons of farm-yard manure on land sown to barley increased the yield 16 bus. 42 lbs. per acre. These rotations will provide interesting and valuable information in regard to cost of production and economy of soil fertility. Follow them. (See plans for details of rotations followed.)

Live Stock.

Other than the horses necessary to do the work and cows for the provision of milk for family use, no live stock were kept

at this Station prior to the fall of 1909. In December of that year, a car of steers were bought for feeding. They were fed ground frozen wheat, were fed outside, given hay, salt and free access to water. They were sold in March, 1910, and showed a profit of $16.40 per head. During the winter of 1910-11, a second car were fed, also outside, and under similar conditions, the ration only varying. Ground oats and barley were fed and the cattle allowed straw in addition to hay. Sold in April, these cattle made a profit of $28.90 per head after paying for all feed. Hogs have since been added to the live stock kept and data will be available as to the cost of producing bacon.

Detail of Rotations as Indicated in the Plan of the Experimental Station at Lacombe, Alta.

Rotation "L," commenced 1910.

1st year.—Hay.
2nd year.—Pasture, manure 12 tons per acre.
3rd year.—Pasture.
4th year.—Wheat.
5th year.—Oats.
6th year.—Barley (seeded down to timothy, alsike, red clover.)

Rotation "N," commenced 1910.

1st year.—Alfalfa.
2nd year.—Alfalfa. Manure, 6 tons per acre.
3rd year.—Alfalfa.
4th year.—Alfalfa. Manure, 6 tons per acre.
5th year.—Alfalfa.
6th year.—Wheat.
7th year.—Grain.

Rotation "V."

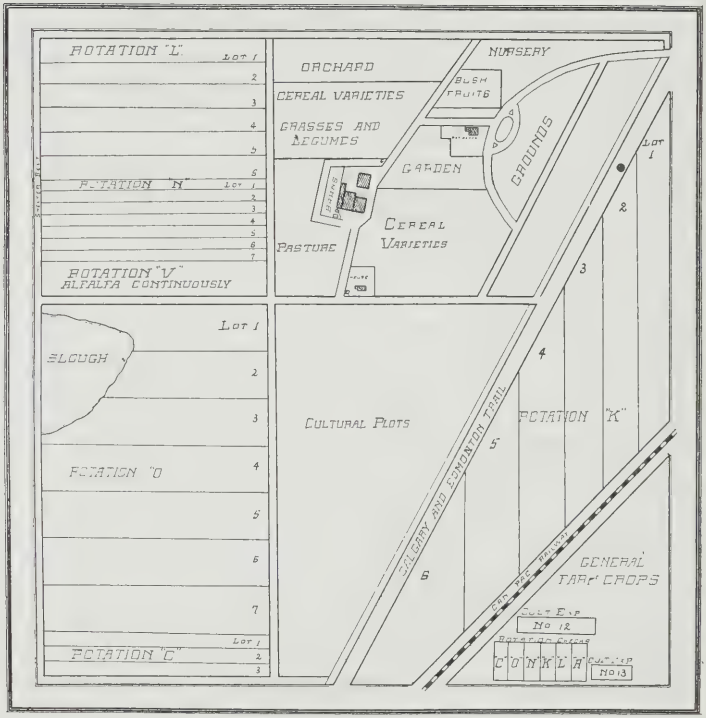
Alfalfa continuously.

Rotation "C," commenced 1910.

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat.

Rotation "K," commenced 1911.

1st year.—Hoed crop.
2nd year.—Wheat.
3rd year.—Barley seeded down.
4th year.—Hay. Manure, 12 tons per acre.
5th year.—Pasture.
6th year.—Pasture.



EXPERIMENTAL STATION
AT
LACOMBE, ALTA.

EXPERIMENTAL STATION

FOR

SOUTHERN ALBERTA,

LETHBRIDGE, ALTA.

The Experimental Station at Lethbridge consists of 400 acres, located one mile east of the corporate limits of the City of Lethbridge, and is crossed by the Crow's Nest branch of the Canadian Pacific Railway.

This land, together with the water rights, was donated to the Dominion Government by the Alberta Railway and Irrigation Company. A strip of land on the east side of the farm, running north and south and containing 100 acres, is irrigable; the remaining 300 is non-irrigable, being devoted to experimental work under "dry-farming" conditions.

The soil is quite uniform throughout, being a dark-grey loam, similar to a great deal of the soil in this district, although perhaps slightly lighter in character than some. The farm was all virgin prairie when possession was obtained.

A barn 38 feet by 72 has since been erected. The greater part of the ground floor is laid out in stalls for the work horses, but one end is partitioned off for carriages. On the second floor is a room in which the feed bins are located. The rest of the space is used as a hay loft.

Another building, 78 feet by 28, has been built, the ground floor of which is used for the storing of implements and tools, with sufficient room at one end to operate a small threshing machine. The upper floor is used as a general work room and storage place for grains.

A house for the Superintendent and a cottage, used as a boarding house for the men, have also been built.

The experimental work at this Station is, therefore, of a two fold character, most of the field experiments on the non-irrigated portion being duplicated on the irrigated part of the farm. In connection with the latter, valuable information relative to the actual amount of water required to irrigate various crops is being collected, all the water turned from the Irrigation Company's ditch for use on the farm being measured by self-recording registers, so that the amount used for each day and for each crop is known. The accumulation of such data for a

number of years will be of much value to all those interested in irrigation problems, to whom such information has not hitherto been available in this country.

Horticulture.

Two orchards containing apples and small fruits have been established, one on the irrigated and one on the non-irrigated land.

In the spring of 1908, there were set out in the irrigated orchard, twenty-six different varieties of standard and crab, and twelve varieties of cross-bred, apples, and in the non-irrigated orchard sixty-eight standard and crab and seventeen cross-breds. Although the tops have killed back in many cases each winter, and there are some trees that have succumbed entirely, still the majority of those set out are alive. As yet there have been only one or two trees that have shown bloom and no fruit has set.

In the spring of 1909, permanent plantations of red, white and black currants, gooseberries and raspberries were set out on both dry and irrigated land. The currants have all been quite hardy, though they have fruited very little so far. Many of the gooseberries set out have died. The raspberries have grown well and have been reasonably productive, but with them it has been found necessary to bend the canes over and cover them with earth each fall, before winter sets in. Among the nine varieties of raspberries tested, the Sunbeam has shown itself to be the hardiest and also the most productive, although the Herbert has been almost as prolific and the berry is much larger, though the variety is probably a little less hardy.

Strawberries have only been grown on the irrigated land. Some thirty-six varieties have been tested and very satisfactory results have been obtained. The Senator Dunlap may be mentioned as being one of the most promising of those tested so far, both in hardiness and productiveness.

We have as yet done very little with plums.

Too much stress cannot be laid on the importance of establishing good windbreaks before attempting much in the way of fruit-growing of any kind here.

Vegetable Garden and Flowers.

The vegetables and flowers have all been grown under irrigation so far.

In the laying-out of the vegetable garden on irrigated land, care must be exercised to see that the rows are planted in a direction to allow the water to run readily between them with-

out flooding. When it is desired to give an irrigation, make a small trench between the rows, without throwing earth against the plants if possible, and then allow only a small stream of water to trickle down.

An excellent plan for a garden on a non-irrigated farm is to have it double the size required, keeping half of it in summer fallow so as to provide for a good supply of moisture in the subsoil in dry years. Use only well-rotted manure and apply it the season the land is being summer-fallowed. This insures a more thorough incorporation of the manure with the soil, which increases the latter's ability to retain moisture, a point fully as important as an increase in fertility. Always give level cultivation and hill or bank the plants as little as possible to avoid drying out the land.

With flowers, there is a long list of the hardy annuals that thrive with any reasonable care, but among them all, there is none that reaches greater perfection or meets with more popular favour under our conditions than does the sweet pea. The pansy is also a great favourite, producing particularly large blooms.

In any flower garden, and particularly in a farmer's, the hardy perennials have a place, and among them there is none more deserving of special mention than the pæony, not only on account of its beauty, but on account of its hardiness after it is once established.

Cultural Work.

On account of the light rainfall in Southern Alberta, special attention has to be given the cultural methods employed in order to obtain maximum results. Much has yet to be learned in regard to details, but, speaking broadly, it is necessary for a farmer to keep one-third of his land under summer-fallow each year. The main object aimed at is to conserve moisture. The year that the land is fallow, all the precipitation has a chance to percolate down into the subsoil, none of it being used to support vegetation, and it is thus stored in an available place for the crop to draw upon during the periods of dry weather the following season. It is probable that the effect of a summer-fallow extends in a certain measure to the second crop following.

In beginning the cultivation of virgin prairie, experience has taught that, as a rule, it does not pay to plant a crop on land freshly broken before the sods have been given a chance to rot. The best results are obtained by breaking the sod in May or early June and allowing it to stand during the summer. In the latter part of August, winter wheat (or rye, if desired), may be sown or the land may be allowed to stand over for spring

grain. If garden truck or trees, etc., are to be planted, the land should be backset—that is, reploughed two or three inches deeper han it was broken, during the latter part of the summer or early fall.

As to the most satisfactory crops, this district has shown itself to be pre-eminently suited to the raising of wheat, both winter and spring. Among the winter wheats tested so far, those of the Turkey Red type appear to be much hardier and better suited to our conditions than are the softer wheats commonly grown in Ontario.

Red Fife stands first in the list of spring wheats. In locations where the season is not quite long enough for this variety, the Marquis is probably the best substitute, next to it the Preston or some similar hard variety.

Among the varieties of oats that have given satisfaction might be mentioned the Banner, Abundance and Improved American. All of the standard varieties of barley tested have given fair returns, but our results so far would not warrant us in mentioning any particular variety as the best suited to our conditions.

The hay question is perhaps one of the most perplexing problems confronting the farmer on non-irrigated land in the southern part of the province, for with a perennial crop, it is impossible to introduce a summer-fallow every third year to stimulate growth by the addition of soil moisture conserved thereby.

The kinds of forage crops that are best suited to our conditions are alfalfa, brome grass and western rye grass. Timothy and clover, except in a few more favoured locations, are not so satisfactory.

Rotations.

The necessity of having to introduce a summer-fallow occasionally to create a supply of moisture in the sub-soil makes the problem of determining suitable rotations a difficult one. To gather information along this line, a number of rotations were inaugurated in the spring of 1911 and an outline of them is herewith given:—

Rotation 'A."

Wheat continuously year after year.

Rotation "B."

1—Summer-fallow.
2—Grain—wheat.

ROTATION "C."

1—Summer-fallow.
2—Grain—wheat.
3—Grain—wheat or coarse grains.

ROTATION "T."

1—Summer-fallow.
2—Wheat.
3—Oats or barley.
4—Summer-fallowed May, seeded to alfalfa late June, in rows 21 inches apart.
5—Alfalfa hay.
6—Alfalfa hay.
7—Alfalfa hay or pasture.
8—Summer-fallow.
9—Hoed crops.
10—Wheat—manure applied on stubble.

ROTATION "M."

1—Summer-fallow.
2—Wheat.
3—Coarse grain—manure on stubble in fall.
4—Summer-fallow.
5—Peas and oats for hay.
6—Barley or oats.

ROTATION 'S.'

1—Summer-fallow.
2—Hoed crops.
3—Wheat.
4—Summer-fallow.
5—Wheat.
6—Coarse grain.
7—Summer-fallow.
8—Peas and oats for hay—seeded in fall to rye.
9—Rye pasture.

Irrigated Land.

To make an irrigated farm in Southern Alberta most profitable at the present time, a major portion of it should be kept in hay, probably alfalfa. With good management, alfalfa may be made to yield from four to six tons per acre, which makes stock feeding or dairying profitable.

The varieties of grain found suitable for the non-irrigated land are quite as satisfactory when raised under irrigation. In this connection, it might be of interest to note that the two-row barleys outyield the six-row varieties, making it probable that the raising of barley for malting purposes would be a safe venture. Potatoes usually give exceptionally heavy yields on irrigated land.

With reference to rotations, it might be stated that almost any arrangement of the crops will give good results if about sixty per cent. of the land is kept seeded down with alfalfa.

Live Stock.

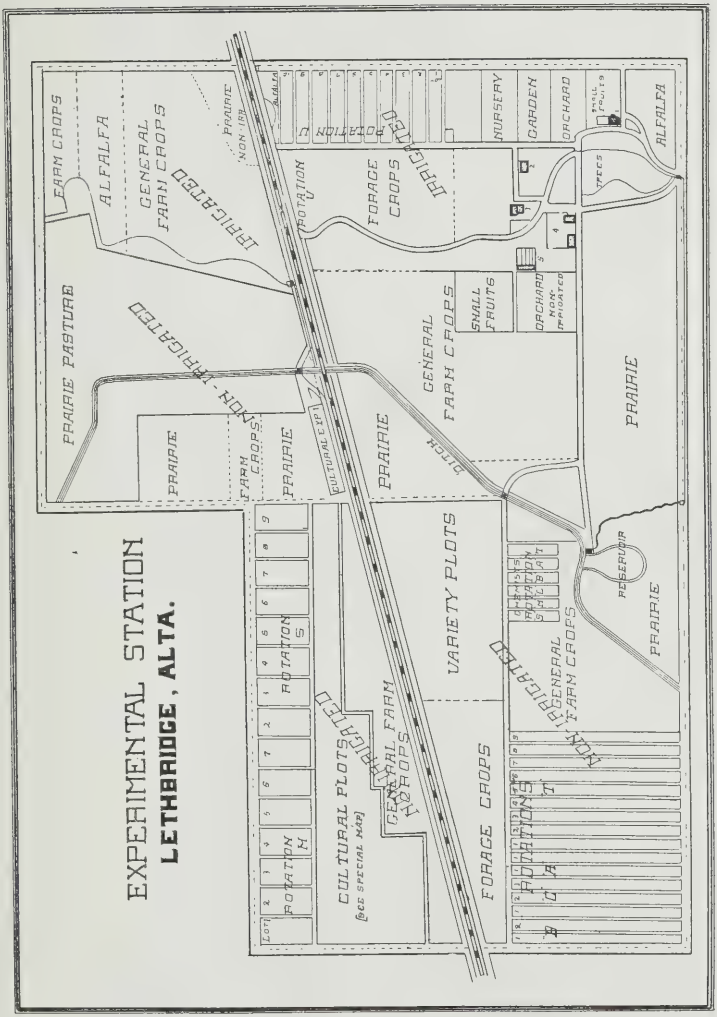
The Station began its first experiment with live stock during the fall of 1911, with a lamb feeding test. Up to this time, no stock of any kind beyond what was necessary to operate the Farm had been kept. This experiment was inaugurated mainly for the purpose of determining a profitable means of marketing a portion of the alfalfa crop, the acreage of which is increasing so rapidly on the irrigated farms in Southern Alberta. In addition to comparing the relative values of mixed grains and elevator screenings in producing gains, the benefit derived from roots when fed in conjunction with alfalfa alone and also with grain and alfalfa was tested.

Sheep in Southern Alberta up to the present time are raised in large bands on the open range, receiving no hay except during bad storms, having to depend entirely on grazing. The result of such conditions is that there are heavy offerings of range animals in the fall and a shortage of sheep fit for mutton during the latter part of the winter and spring. A more uniform and higher-priced market would be maintained throughout the year if some were held over on feed.

Following is an outline of the experiment with lambs, carried on at the Station in 1911. Two hundred and fifty wether range lambs were purchased and delivered to the Station at the time of weaning. After being allowed to run on the stubble for a period of three weeks, they were divided into five groups of fifty each. The make-up of these groups was as nearly uniform as regards type and weight as it was possible to have them. A sixteen-week feeding period was decided on.

The plan of feeding was as follows:—

Alfalfa constituted the sole roughage, the five groups being fed for the first two weeks on it alone. Then group one had mixed grain added to its ration, group two, elevator screenings, group three, roots and mixed grains, group four, roots alone, whilst group five received mixed grains for hardening off for a period of two weeks before going to market. Group five were


EXPERIMENTAL STATION
LETHBRIDGE, ALTA.
FARM CROPS
ALFALFA
GENERAL FARM CROPS
IRRIGATED
PRAIRIE PASTURE
NON-IRRIGATED
PRAIRIE
FARM CROPS
PRAIRIE
CULTURAL STRIP
ROTATION H
ROTATION I
ROTATION J
ROTATION K
ROTATION L
CULTURAL PLOTS
(SEE SPECIAL MAP)
GENERAL FARM CROPS
VARIETY PLOTS
FORAGE CROPS
PRAIRIE
GENERAL FARM CROPS
IRRIGATED
NON-IRRIGATED
FORAGE CROPS
ROTATIONS
PRAIRIE
RESERVOIR
PRAIRIE
GENERAL FARM CROPS
SMALL FRUITS
ORCHARD
NON-IRRIGATED
FORAGE CROPS
NURSERY
GARDEN
ORCHARD
TREES
ALFALFA

fed alfalfa alone throughout the major part of the period, for the purpose of determining just what can be done with practically no grain fed.

The returns from this experiment were quite satisfactory, the net profit after deducting cost of lambs, feed, labour and interest on investment being $229.30.

Detail of Rotations as Indicated on the Map of the Experimental Station at Lethbridge, Alta.

Rotation "A".

Wheat continuously.

Rotation "B".

1st year.—Wheat.
2nd year.—Summer-fallow.

Rotation "C".

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat, or coarse grain.

Rotation "M".

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Coarse grain, manure in fall.
4th year.—Summer-fallow.
5th year.—Peas and oats for hay.
6th year.—Barley or oats.

Rotation "S".

1st year.—Summer-fallow.
2nd year.—Hoed crop.
3rd year.—Wheat.
4th year.—Summer-fallow.
5th year.—Wheat.
6th year.—Coarse grain.
7th year.—Summer-fallow, manured.
8th year.—Peas and oats for hay. Seeded in fall to rye.
9th year.—Rye pasture.

Rotation "U".

1st year.—Seeding alfalfa.
2nd year.—Alfalfa hay.
3rd year.—Alfalfa hay.
4th year.—Alfalfa hay.
5th year.—Alfalfa hay.
6th year.—Alfalfa hay.
7th year.—Hoed crop.
8th year.—Wheat.
9th year.—Wheat or coarse grain.
10th year.—Coarse grain.

Rotation "T".

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Oats or barley.
4th year.—Summer-fallowed in May, seeded to alfalfa late in June.
5th year.—Alfalfa hay.
6th year.—Alfalfa hay.
7th year.—Alfalfa hay or pasture.
8th year.—Summer-fallow.
9th year.—Hoed crop.
10th year.—Wheat manure on stubble.

Buildings as Numbered on Map.

1.—Superintendent's residence.
2.—Foreman's house.
3.—Boarding house.
4.—Barns.
5.—Sheep Pens.

CULTURAL PROBLEMS ON THE PRAIRIES.

On the prairies, some of the most difficult problems to solve are those having to do with breaking virgin prairie, preparatory to crop production; moisture conservation; forage crop production; conservation or increase of soil fertility and weed eradication. With a view to gaining some information as to methods of cultivation likely to give best results along the lines mentioned, the investigational work outlined below was begun at Brandon, Indian Head, Rosthern, Scott, Lacombe and Lethbridge in 1911.

EXPERIMENT No. 1.

PRAIRIE BREAKING.

1.—Ploughed 3″ to 4″ early spring, pack, double disc, harrow, double disc, sow to peas and oats.

2.—Ploughed 3″ to 4″ early spring, pack, double disc, harrow, double disc, sow to flax.

3.—Ploughed 3″ to 4″ early spring, pack, double disc, harrow, sow to flax.

4.—Broken early June, 4″ to 5″, kept cultivated from day broken.

5.—Broken early June, 2″ to 3″, rolled, backset early September, kept cultivated from day broken.

6.—Broken early spring 4″, worked and sown to fall wheat (Lethbridge only).

Only five plots required each year.

1st year.—To be treated as above.
2nd year.—Plots to be in wheat.
3rd year.—Plots to be in wheat.
4th year.—Summer-fallow.
5th year.—Wheat.

Experiment to be continued five years with new land each year.

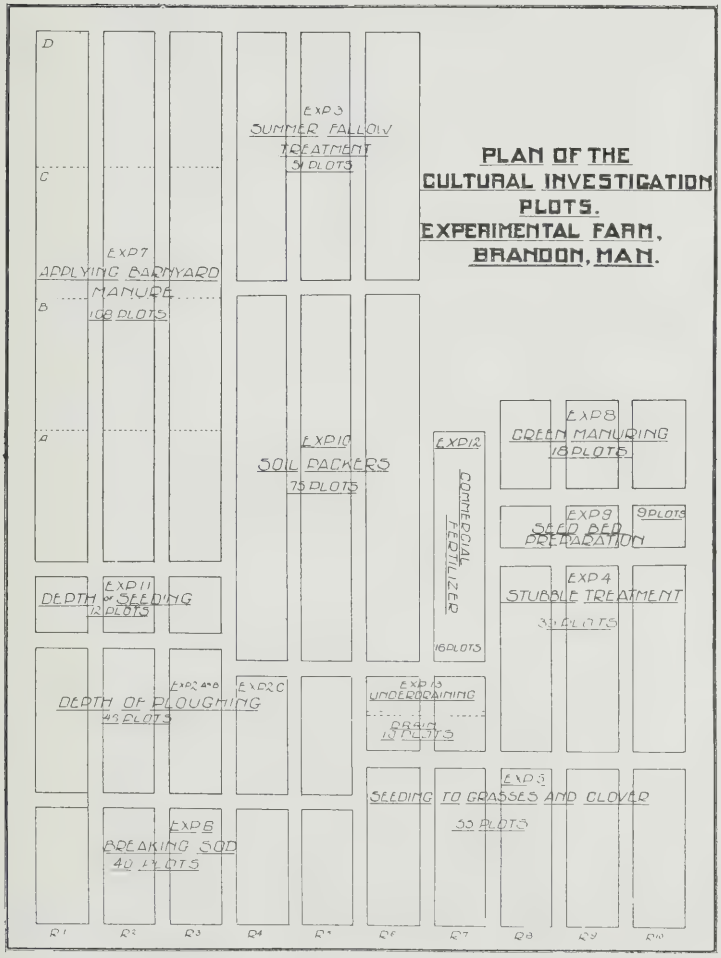
Flax.—30 to 40 lbs. per acre, sow 15th to 25th May.
Peas and Oats.—1 bushel oats, 2 bushels peas per acre.

EXPERIMENT No. 2.

DEPTH OF PLOUGHING.

Ploughing on wheat stubble to be sown to oats:—

A. 1.—Ploughing three (3) inches deep.
2.—Ploughing four (4) inches deep.
3.—Ploughing five (5) inches deep.
4.—Ploughing five (5) inches deep.
5.—Ploughing five (5) inches deep


PLAN OF THE
CULTURAL INVESTIGATION
PLOTS.
EXPERIMENTAL FARM,
BRANDON, MAN.
D
C
B
A
EXP 3
SUMMER FALLOW
TREATMENT
54 PLOTS
EXP 7
APPLYING BARNYARD
MANURE
108 PLOTS
EXP 10
SOIL PACKERS
75 PLOTS
EXP 12
COMMERCIAL FERTILIZER
16 PLOTS
EXP 8
GREEN MANURING
18 PLOTS
EXP 9
SEED BED
PREPARATION
9 PLOTS
EXP 4
STUBBLE TREATMENT
33 PLOTS
EXP 11
DEPTH OF SEEDING
12 PLOTS
EXP 2 A & B
EXP 2 C
DEPTH OF PLOUGHING
40 PLOTS
EXP 13
UNDERDRAINING
DRAIN
13 PLOTS
EXP 5
SEEDING TO GRASSES AND CLOVER
33 PLOTS
EXP 6
BREAKING SOD
40 PLOTS
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10

Ploughing on wheat stubble to be sown to oats.—*Con.*

6.—Ploughing five (5) inches deep.
7.—Ploughing five (5) inches deep.
8.—Ploughing five (5) inches deep.
9.—Ploughing five (5) inches deep.
10.—Ploughing five (5) inches deep.

Ploughing for Summer-Fallow:—

B. 1.—Ploughing three (3) inches deep.
2.—Ploughing four (4) inches deep.
3.—Ploughing five (5) inches deep.
4.—Ploughing six (6) inches deep.
5.—Ploughing seven (7) inches deep.
6.—Ploughing eight (8) inches deep.
7.—Ploughing five (5) inches deep, subsoil 4 inches.
8.—Ploughing six (6) inches deep, subsoil 4 inches.
9.—Ploughing seven (7) inches deep, subsoil 4 inches.
10.—Ploughing eight (8) inches deep, subsoil 4 inches.

On Sod:—

C. 11.—Ploughing three (3) inches deep sod and stubble.
12.—Ploughing four (4) inches deep sod and stubble.
13.—Ploughing five (5) inches deep sod and stubble.
14.—Plouging three (3) inches deep on sod and 6 inches deep fall or spring after wheat.

On plots 1 to 10 a three-year rotation is to be followed.

1st year.—Summer-fallow.
2nd year.—Wheat, plough late September.
3rd year.—Oats, disc early autumn.

In this way, plot No. 1 is ploughed 3″ deep as summer fallow and 3″ deep as stubble; plot No. 2, 4″ deep as summer fallow and 4″ deep as stubble; plot No. 5, 7″ deep as summer fallow and 5″ deep as stubble. In cases of all other plots stubble is ploughed 5″ deep.

On plots 11, 12, 13 and 14, a four-year rotation is to be followed.

1st year.—Wheat. Ploughed fall or spring same depth as when ploughed from sod, except plot 14.
2nd year.—Oats. Seeded down rye grass 5 lbs., timothy 5 lbs., red clover 5 lbs., alfalfa 5 lbs.
3rd year.—Hay.
4th year.—Hay. Plough right after hay is cut, cultivate rest of season to insure rotting of sod.

For this work, 30 plots are required for summer-fallow and stubble ploughing and 16 plots for sod ploughing, or 46 plots in all.

On plots 1 to 10, manure 6 tons per acre on wheat stubble, early fall.

On plots 11, 12, 13 and 14, manure 8 tons per acre autumn, first year in hay.

EXPERIMENT NO. 3.

SUMMER-FALLOW TREATMENT.

1.—Plough 4″ June, pack if necessary and practicable, cultivate as necessary.
2.—Plough 6″ June, pack if necessary and practicable, cultivate as necessary.
3.—Plough 8″ June, pack if necessary and practicable, cultivate as necessary.
4.—Plough 4″ June, cultivate.
Plough 4″ September, harrow.
5.—Plough 6″ June, cultivate.
Plough 6″ September, harrow.
6.—Plough 8″ June, cultivate.
Plough 8″ September, harrow.
7.—Plough 6″ June, cultivate.
Plough 4″ September, harrow.
8.—Plough 4″ June, cultivate.
Plough 6″ September, harrow.
9—Plough 4″ June, early as possible, cultivate..
Plough 6″ September, leave untouched.
10.—Plough 5″ June, seed to rape or other green forage crop and pasture off.
11.—Plough 6″ May 15th, harrow and pack if necessary, cultivate as necessary.
12.—Plough 6″ June 15th, harrow and pack if necessary, cultivate as necessary.
13.—Plough 6″ July 15th, harrow and pack if necessary, cultivate as necessary.
14.—Fall cultivate before summer-fallowing.
Plough 6″ June, harrow and pack if necessary, cultivate as necessary.
15.—Fall plough 4″ before summer-fallowing.
Plough 6″ June, harrow and pack if necessary, cultivate as necessary.
16.—Plough 6″ June, pack, cultivate as necessary.
17.—Plough 6″ June, no packing, otherwise same as other plots.

For this work, three groups of 17 plots each are required. A three-year rotation is followed.

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Oats.

Ploughed as early in June as possible, excepting plots 11, 12 and 13.

Apply 6 tons manure per acre on first year stubble in early fall.

EXPERIMENT No. 4.

STUBBLE TREATMENT.

WHEAT STUBBLE AND SOWING TO WHEAT.

1—Plough—Autumn.
2—Disc harrow—Autumn.
3—Burn stubble, then disc—Autumn.
4—Burn stubble, then plough—Autumn.
5—Burn stubble in spring—Seed at once.
6—Plough in spring—Seed at once.
7—Disc at cutting time—Spring plough.
8—Disc at cutting time—Autumn plough.
9—Plough autumn—Subsurface pack at once.
10—Plough spring—Seed—Subsurface pack.

WHEAT STUBBLE BUT SOWING TO OATS.

11—Plough autumn—Subsurface pack at once.
12—Plough spring—Seed—Subsurface pack.
13—Cultivate autumn—Spring plough—Seed.

In each case such additional cultivation before seeding to be given in spring as may seem necessary to prepare a good seed bed. Packer not to be used except where mentioned.

This line of experiments requires 39 plots. A three-year rotation is followed.

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat—plots 1 to 10.
Oats—plots 11 to 13.

All summer-fallow ploughing to be 6″ deep early in June.
Ploughing stubble for wheat 4″ in fall and 4″ in spring.
Ploughing stubble for oats 5″ in fall and 5″ in spring.

EXPERIMENT No. 5.

SEEDING TO GRASS AND CLOVER.

1—Seeding rye grass 10 lbs. and red clover 10 lbs. with nurse crop on summer-fallow.
2—Seeding rye grass 10 lbs. and red clover 10 lbs. alone after summer-fallow.

3—Seeding rye grass 10 lbs. and red clover 10 lbs. with nurse crop on first year after hoed crop.

4—Seeding rye grass 10 lbs. and red clover 10 lbs. alone after hoed crop.

5—Seeding rye grass 10 lbs. and red clover 10 lbs. with nurse crop on first year wheat stubble.

6—Seeding rye grass 10 lbs. and red clover 10. lbs. alone after first year wheat.

7—Seeding rye grass and red clover with oats to cut green on first year wheat stubble.

8—Seeding rye grass 10 lbs. and red clover 10 lbs. alone on first year wheat stubble, manure 8 tons per acre, ploughed preceding fall.

9—Seeding rye grass 10 lbs. and red clover 10 lbs. with nurse crop on second year wheat stubble.

10—Seeding rye grass 10 lbs. and red clover 10 lbs. alone after second year grain (oats).

11—Seeding rye grass 10 lbs. and red clover 10 lbs. with nurse crop on second year after hoed crop.

For this work, 55 plots are required, 5 groups of 11 each. Each plot is left at least 2 years in grass, excepting plots 9 and 10, and is left long enough to permit of the right point in the rotation being reached to allow seeding according to directions, the object being to try methods of seeding, regardless of other considerations. All plots in any one range to be seeded down the same year.

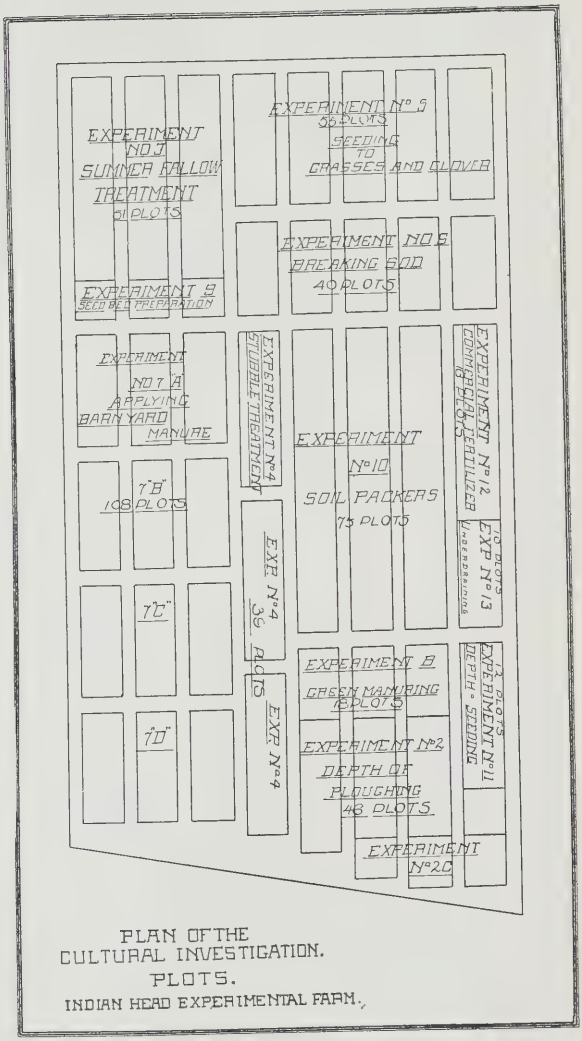
Barnyard manure is applied autumn of first year in grass, 12 tons per acre.

Rotations followed in seeding to Grass and Clover Experiments.

Since the rotations necessary to follow to bring each plot into proper shape for seeding to grass must vary, the rotation for each plot is given below. All rotations will be of five years' duration. All grass seeding to be done on one range each year.

Seeding to Grass and Clover Rotations.

Plot.	1st Year.	2nd Year.
1	Fallow	Seeded with wheat.
2	Fallow	Seeded alone.
3	Hoed crops	Seeded with wheat.
4	Hoed crops	Seeded alone.
5	Wheat	Seeded with wheat on stubble.
6	Wheat	Seeded alone.
7	Wheat	Seeded with oats on wheat stubble.
8	Wheat	Seeded alone.
9	Wheat	Seeded with wheat.
10	Oats	Seeded alone.
11	Wheat	Seeded with wheat.



PLAN OF THE
CULTURAL INVESTIGATION.
PLOTS.
INDIAN HEAD EXPERIMENTAL FARM.

Plot.	3rd Year.	4th Year.	5th Year.
1	Hay	Hay	Hay.
2	"	"	"
3	"	"	"
4	"	"	"
5	"	"	Summer-fallow.
6	"	"	"
7	"	"	"
8	"	"	"
9	"	Summer-fallow	Wheat.
10	"	"	"
11	"	Hay	Hoed crop.

Experiment No. 6.

BREAKING SOD FROM CULTIVATED GRASSES AND CLOVERS.

1—Plough July 20th to 30th, 5 inches deep. Pack and disc at once—disc in fall.

2—Plough October, 5 inches deep—pack—disc harrow.

3—Plough early July 3 inches deep—backset September, cultivate as necessary.

4—Stiff-tooth rip July—plough 5 inches deep September—cultivate.

5—Spring plough 5 inches deep—seed same spring to wheat.

6—Duplicate No. 5—sow flax.

7—Repeat No. 5—sow peas.

8—Plough May 15th—work as summer-fallow.

In each case, necessary cultivation to be given at right time to insure success. Packer to be used on every plot at right time.

Forty plots are required for this experiment. Five groups of eight each in five-year rotation:—

1st year.—(1911). Seed down, no nurse crop, western rye grass 10 lbs., alfalfa 3 lbs., clover 3 lbs. per acre.

2nd year—Hay.

3rd year.—Hay.

4th year.—Break.

5th year.—Crop, and seed western rye grass 10 lbs., alfalfa 3 lbs., red clover 3 lbs. Leave stubble and new seeds as long as possible in order to be able to judge of catch of seed, then plough and prepare for seeding next spring without nurse crop, as in first year of rotation.

In 1911.—Whole area will be seeded down without nurse crop.

In 1912.—Whole area will be under hay.

In 1913.—First group of eight to be broken according to scheme; rest in hay.
In 1914.—First group of eight to be in grain, seeded down as described and reploughed in fall.
Second group of eight to be broken.
Rest of groups in hay.
In 1915.—First group seeded down, no nurse crop.
Second group to be in grain seeded down as described, then fall ploughed.
Third group to be broken.
Rest of groups in hay.
In 1916.—First group in first year hay, etc.

EXPERIMENT No. 7.

APPLYING BARNYARD MANURE.

ON CORN OR ROOTS.

A. 1.—No manure, second year stubble, ploughed in autumn.
2.—Apply on surface in autumn after ploughing second year stubble, and work in at once.
3.—Apply in spring on surface of ploughed land, second year stubble and work in at once.
4.—Plough in autumn right after applying, second year stubble.
5.—Plough in spring right after applying, second year stubble.
6.—Winter apply, plough in spring, second year stubble.
7.—Winter apply, green manure (cut straw) on second year stubble—plough in spring.
8.—Winter apply, green manure (cut straw) on summer-fallow—disc in.
9.—Summer-fallow—Hoed crop—Wheat.

Three-year rotation followed:—
1st year.—Hoed crop.
2nd year.—Wheat.
3rd year.—Wheat.

In case of plots No. 8 and 9 a special rotation as follows:—
1st year.—Hoed crop.
2nd year.—Wheat.
3rd year.—Summer-fallow.

On Wheat.

B. 1.—Apply in winter green manure (cut straw) first year stubble—disc in.
2.—Apply in winter green manure (cut straw) summer-fallow—disc in.
3.—Apply with spreader after grain sown on first year stubble.
4.—Apply with spreader after grain sown on summer-fallow.
5.—No manure—Fall ploughed—First year stubble.
6.—Apply on surface first year stubble and plough in in autumn.
7.—Apply on surface first year stubble and plough in in spring.
8.—No manure—Disc—First year stubble.
9.—No manure. Burn stubble.

Three-year rotation to be followed:—
1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat.
Manure applied to affect second year crop of wheat unless otherwise stated.

On Barley.

C. 1.—Apply in winter green manure (cut straw) on first year stubble. Disc in.
2.—Apply in winter green manure (cut straw) on summer-fallow, sow barley on summer-fallow.
3.—Apply with spreader after barley sown on first year stubble.
4.—Apply with spreader after seeding barley on summer-fallow.
5.—No manure. Fall ploughed. First year stubble.
6.—Apply on surface first year stubble and plough in in autumn.
7.—Apply on surface first year stubble and plough in in spring.
8.—No manure. Disc. First year stubble.
9.—No manure. Burn stubble.

Three-year rotation to be followed:—
1st year.—Summer-fallow.
2nd year.—Wheat or barley as indicated.
3rd year.—Barley, or oats as indicated; where barley follows summer-fallow, oats to follow barley.
Manure to be applied to affect crop of barley.

On Oats.

D. 1.—Apply in winter green manure (cut straw) on first year stubble. Disc in.
2.—Apply in winter green manure (cut straw) on summer-fallow, sow oats on summer-fallow.
3.—Apply with spreader after grain sown on first year stubble.
4.—Apply with spreader after seeding to oats on summer-fallow.
5.—No manure. Fall ploughed. First year stubble.
6.—Apply on surface first year stubble and plough in autumn.
7.—Apply on surface first year stubble and plough in spring.
8.—No manure. Disc. First year stubble.
9.—No manure. Burn stubble.

Three-year rotation to be followed:—
1st year.—Summer-fallow.
2nd year.—Wheat or oats as indicated.
3rd year.—Oats or barley as indicated; where oats follows summer-fallow, barley should follow oats.

Manure applied to affect crop of oats.

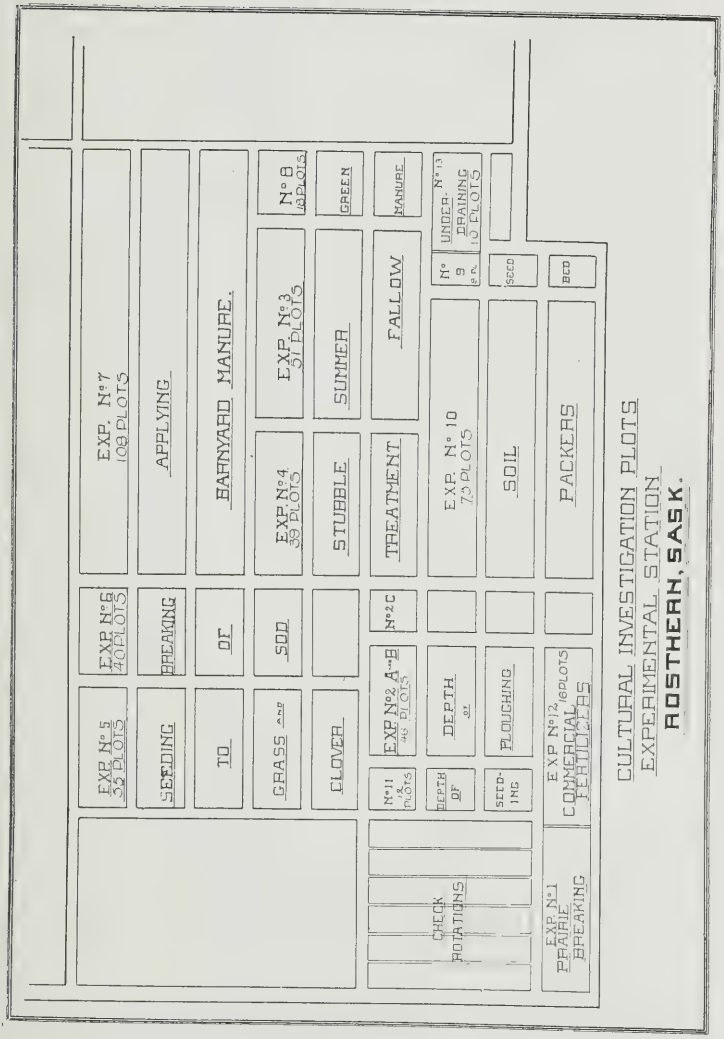
Experiment No. 8.

GREEN MANURING.

1.—Summer-fallow.
2.—Peas, two bushels Golden Vine (or other similar variety) ploughed under early in July.
3.—Peas, two bushels Golden Vine, ploughed under when in blossom.
4.—Tares, 1 bushel per acre, ploughed under late July.
5.—Summer-fallow, barnyard manure, 12 tons per acre, applied on summer-fallow in September.
6.—Summer-fallow.

For this work, 3 groups of plots of 6 each, or 18 plots in all, are required.

In 1911.—Group 1. Treated.
Group 2. Wheat.
Group 3. Oats.


EXP. N° 5
35 PLOTS
SEEDING
TO
GRASS
CLOVER
EXP. N° 6
40 PLOTS
BREAKING
OF
SOD
EXP. N° 7
100 PLOTS
APPLYING
BARNYARD MANURE.
EXP. N° 4
39 PLOTS
STUBBLE
TREATMENT
EXP. N° 3
51 PLOTS
SUMMER
FALLOW
N° 8
48 PLOTS
GREEN
MANURE
CHECK ROTATIONS
N°11
4
PLOTS
DEPTH OF SEED-ING
EXP N°2 A-B
40 PLOTS
DEPTH OF
PLOUGHING
N°2C
EXP. N° 10
73 PLOTS
SOIL
PACKERS
N° 9
9 PLOTS
SEED
BCD
UNDER N° 13
FRAINING
10 PLOTS
EXP. N°1
PRAIRIE
BREAKING
EXP N°12
COMMERCIAL
FERTILIZERS
6PLOTS
CULTURAL INVESTIGATION PLOTS
EXPERIMENTAL STATION
ROSTHERN, SASK.

In 1912.—Group 1. Wheat.
Group 2. Oats.
Group 3. Treated.

In 1913.—Group 1. Oats.
Group 2. Treated.
Group 3. Wheat.

Experiment No. 9.

SEED BED PREPARATION.

1.—Poor preparation.
2.—Good preparation.
3.—Extraordinary preparation.

To carry on this experiment, three groups of three plots each will be required, or nine plots in all.

1911 Group—1. Summer-fallow.
2. Wheat.
3. Oats.

1912 Group—1. Wheat.
2. Oats.
3. Summer-fallow.

1913 Group—1. Oats.
2. Summer-fallow.
3. Wheat.

What constitutes "poor," "good," or "extraordinary" preparation of the seed bed cannot, of course, be described or outlined, hence the judgment of the experimenter will have to be exercised and such preparation given the plot in question as he deems will come nearest being described by the word used, "poor," "good," or "extraordinary."

In the summer-fallow year, all plots are to be treated alike. The treatment when seeding on summer-fallow land the next spring must, however, be such as to merit the descriptive words.

Manure 6 tons per acre on first year stubble.

EXPERIMENT No. 10.

SOIL PACKERS.

SOWING WHEAT ON SUMMER-FALLOW.

A.

Spring work when seeding.

1.—Harrow, seed.
2.—Harrow, seed, surface pack.
3.—Harrow, seed, surface pack, harrow.
4.—Harrow, seed, subsurface pack.
5.—Harrow, seed, subsurface pack, harrow.
6.—Harrow, seed, combination pack.
7.—Harrow, seed, combination pack, harrow.
8.—Surface pack, seed, surface pack.
9.—Subsurface pack, seed, subsurface pack.
10.—Combination pack, seed, combination pack.
11.—Surface pack, harrow, seed.
12.—Subsurface pack, harrow, seed.
13.—Combination pack, harrow, seed.
14.—Harrow, seed.

15.—Plough for summer-fallow, surface pack, cultivate; next spring, smoothing harrow, seed.
16.—Plough for summer-fallow, subsurface pack, cultivate; next spring, smoothing harrow, seed.
17.—Plough for summer-fallow, combination pack, cultivate; next spring, smoothing harrow, seed.
18.—Plough for summer-fallow, surface pack, cultivate; next spring, smoothing harrow, seed, surface pack.
19.—Plough for summer-fallow, subsurface pack, cultivate; next spring, smoothing harrow, seed, subsurface pack.
20.—Plough for summer-fallow, combination pack, cultivate; next spring, smoothing harrow, seed, combination pack.

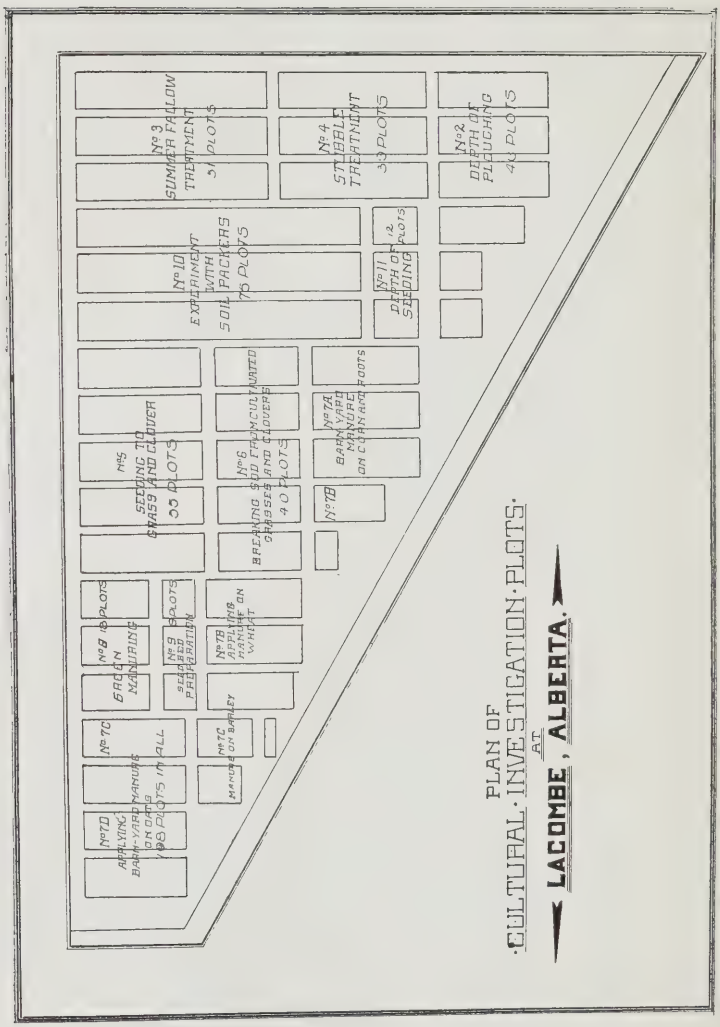
Spring work when seeding.

21.—Harrow, seed.
22.—Harrow seed, harrow when 6″ high.
23.—Harrow, seed, surface pack when 6″ high.
24.—Harrow seed; roll when 6″ high.
25.—Harrow, seed.

SOWING ON SPRING PLOUGHED STUBBLE LAND.

B.

1.—Harrow, subsurface pack, harrow, seed.
2.—Harrow, surface pack, harrow, seed.
3.—Harrow, combination pack, harrow, seed.


PLAN OF
CULTURAL INVESTIGATION PLOTS
AT
LACOMBE, ALBERTA.
No 1 DEPTH OF PLOUGHING 40 PLOTS
No 2 DEPTH OF SEEDING 40 PLOTS
No 3 SUMMER FALLOW TREATMENT 51 PLOTS
No 4 STUBBLE TREATMENT 33 PLOTS
No 5 SEEDING TO GRASS AND CLOVER 55 PLOTS
No 6 BREAKING SOD PLOWED AND HARROWED 40 PLOTS
No 7 BARN YARD MANURE ON CULTIVATED PLOTS
No 8 APPLYING BARN YARD MANURE ON OATS 100 PLOTS IN ALL
No 9 EARLY PREPARATION 40 PLOTS
No 10 EXPLANATORY WITH SOIL PACKERS 75 PLOTS
No 11 DEPTH OF SEEDING 12 PLOTS

4.—Harrow, subsurface pack, harrow, seed, subsurface pack.
5.—Harrow, surface pack, harrow, seed, surface pack.
6.—Harrow, combination pack, harrow, seed, combination pack.
7.—Harrow, seed, harrow.
8.—Harrow, seed, surface pack.
9.—Harrow, seed, subsurface pack.
10.—Harrow, seed, combination pack.
11.—Harrow, seed.

Sowing on Fall Ploughed Stubble Land.

C.

12.—No packer, harrow, seed.
13.—Subsurface pack in fall, seed in spring.
14.—Subsurface pack in spring, then seed.
15.—Subsurface pack in spring, after seeding.
16.—Surface pack in fall, seed in spring.
17.—Surface pack in spring, then seed.
18.—Surface pack in spring after seeding.
19.—Combination pack in fall, seed in spring.
20.—Combination pack in spring, then seed.
21.—Combination pack in spring after seeding.
22.—No packer, harrow, seed.
23.—Surface pack in fall, seed, surface pack.
24.—Subsurface pack in fall, seed, subsurface pack.
25.—Combination pack in fall, seed, combination pack.

To carry on this work, 75 plots are necessary, three groups of 25 each. Each year the experiments on summer-fallow are tried on the group under summer-fallow the previous year.

A three-year rotation is followed:—

1st year—Summer-fallow.
2nd year—Wheat.
3rd year—Wheat.

Manure applied 6 tons per acre on stubble of second crop after summer-fallow, that is, fall previous to summer-fallow.

Method of summer-fallowing:—Fall disc, plough before June 15th, cultivate as necessary; plots 1 to 14 inclusive, and 21 to 25 inclusive. In case of plots 15 to 20 inclusive, summer-fallow as indicated in Exp. No. 10. Section A.

EXPERIMENT No. 11.

DEPTH OF SEEDING.

1.—Sowing 1 inch deep.
2.—Sowing 2 inches deep.
3.—Sowing 3 inches deep.
4.—Sowing 4 inches deep.

For this work 12 plots will be necessary—three groups of four plots each.

Group 1—1911. Summer-fallow.
1912. Wheat.
1913. Oats.

Group 2—1911. Oats.
1912. Summer-fallow.
1913. Wheat.

Group 3—1911. Wheat.
1912. Oats.
1913. Summer-fallow.

Wheat on summer-fallow.
Oats on stubble.
Stubble to be fall ploughed and packed.
Manure 6 tons per acre in autumn on wheat stubble.

EXPERIMENT No. 12.

COMMERCIAL FERTILIZER.

1.—Check. No fertilizer.
2.—N. Eight pounds Nitrate of Soda.
3.—$P^2 O^5$. Fifteen pounds Superphosphate.
4.—K^2 O. Five pounds Muriate of Potash.
5.—Check. No fertilizer.
6.—N. $P^2 O^5$. K^2 O.
7.—N. $P^2 O^5$.
8.—N. K^2 O.
9.—P^2O^5. K^2 O.
10.—Check. No fertilizer.
11.—Basic Slag, 25 lbs.

CULTURAL INVESTIGATION PLOTS
AT
LETHBRIDGE.
EXP 2 30 PLOTS
DEPTH of PLOUGHING
EXP 3 51 PLOTS
SUMMER FALLOW
TREATMENT
EXP 4 39 PLOTS
STUBBLE
TREATMENT
EXP 7 108 PLOTS
APPLYING BARNYARD MANURE
A
B
C
D
EXP 2
12 PLOTS
EXP 5 18 PLOTS
GREEN
MANURING
EXP 10 75 PLOTS
SOIL PACKERS
EXP 11
DEPTH
SEEDING
EXPL
EXP 3
4 PLOTS
EXP 12 16 PLOTS
COMMERCIAL FERTILIZERS
EXP 13 9 PLOTS
UNDERDRAINAGE
EXP 1 66 PLOTS
SEEDING TO
GRASS and CLOVERS
EXP 6 40 PL
CLEANING
SOD FROM
CULTIVATED
GRASSES
AND
CLOVERS

12.—Clover in place of grass.
13.—Clover in place of grass.
14.—Barnyard manure 16 tons per annum.
15.—Barnyard manure 8 tons per annum.
16.—Check. No fertilizer.

Only 16 plots required, all in same range.

On these plots a four-year rotation is to be followed:—

1st year.—Wheat, all plots.
2nd year.—Oats, all plots.
3rd year.—Grass, all plots.
4th year.—Corn, all plots.

All commercial fertilizers to be applied on the surface each spring before seeding.

Barnyard manure to be applied on surface and worked in in fall before corn.

Grass land to be ploughed shallow after one crop hay and kept cultivated rest of season preceding corn.

Experiment No. 13.

UNDERDRAINING.

1.—No drainage.
2.—No drainage.
3.—Well 4′ x 4′ x 6′ deep, drain 3′ deep.
4.—No drainage.
5.—No drainage.
6.—No drainage.
7.—Well 4′ x 4′ x 6′ deep, drain 4′ deep.
8.—No drainage.
9.—No drainage.

For this work, only nine plots will be required. These plots should be so located as to permit of tile drains being laid from plots 3 and 7 with a good fall into a suitable outlet, natural or artificial. All plots to be in same range.

Crops would be:—

1911.—Wheat. all plots.
1912.—Wheat, all plots.
1913.—Summer-fallow, all plots.

Apply 6 tons manure per acre, fall or winter, on the ploughed 6″ stubble first year after summer-fallow.

Agassiz Farm from the Mountain.

EXPERIMENTAL FARM

FOR

BRITISH COLUMBIA,

AGASSIZ, B.C.

The Farm at Agassiz was purchased by the Dominion Government in 1888 and possession was obtained in September, 1889. It is situated at the station of the same name on the main line of the C. P. R., seventy miles east of Vancouver. The Farm lies under the shadow of Mount Cheam, about one and one-half miles from the Fraser River and five miles from Harrison Lake.

The property consists of some 1,400 acres, 300 of which have been, or can be, brought under cultivation. The remainder is mountain or "bench" land, which was purchased to preserve the fine growth of timber trees on it and also to test the possibility of setting out orchards on the mountain slopes, where the situation made it otherwise impossible to make use of the land.

The soil is a loam, of varying quality, underlaid with gravel. Near the mountain it is more peaty in nature, but fertile when cleared and drained. Of the 300 acres of bottom land, 200 have been cleared so far.

Water for the stock and for domestic use is supplied from a concrete and stone reservoir on the mountain side, from which it is piped to the various farm buildings.

Although work along all the main lines of agriculture has been carried on here since the establishment of the Farm, a specialty was made of the testing of varieties of fruits, and of forest, nut and ornamental trees. This work was carried on for twenty-two years, and a very complete collection of data gathered as to the suitability of varieties for this part of B.C.

With the development of agricultural work in other parts of the Province from time to time, it was found that many sections were much better suited for fruit-growing, both from their climatic and soil conditions, than was the Agassiz district, where the winter weather is very changeable, ice-storms occasionally causing great damage by breaking down the trees, and severe frosts, occurring when the soil is saturated with moisture, leading to extensive winter-killing. The weather is frequently

cold and wet at blossoming time, and lack of sunshine prevents good colouring of the fruit. The results obtained from the orchards on the mountain slopes have been much more favourable than from those on the bottom land, due partly to better drainage and, perhaps, to the higher altitude as well.

Experimental work with fruits for British Columbia will in future be carried on in connection with Stations in more favoured localities. One of these, about 52 acres in extent, is situated at Invermere, B.C., and is now being put into shape for this line of work.

The results at Agassiz with forest and nut trees have been fairly successful. A considerable area is devoted to the growing of shrubs, hedges and flowers, and on the lawns almost every variety that will grow in this climate may be found. In the flower garden, roses, bulbs, perennials and from eighty to one hundred varieties of annuals give bloom from the latter part of March to Nov. 15th and, in some seasons, later.

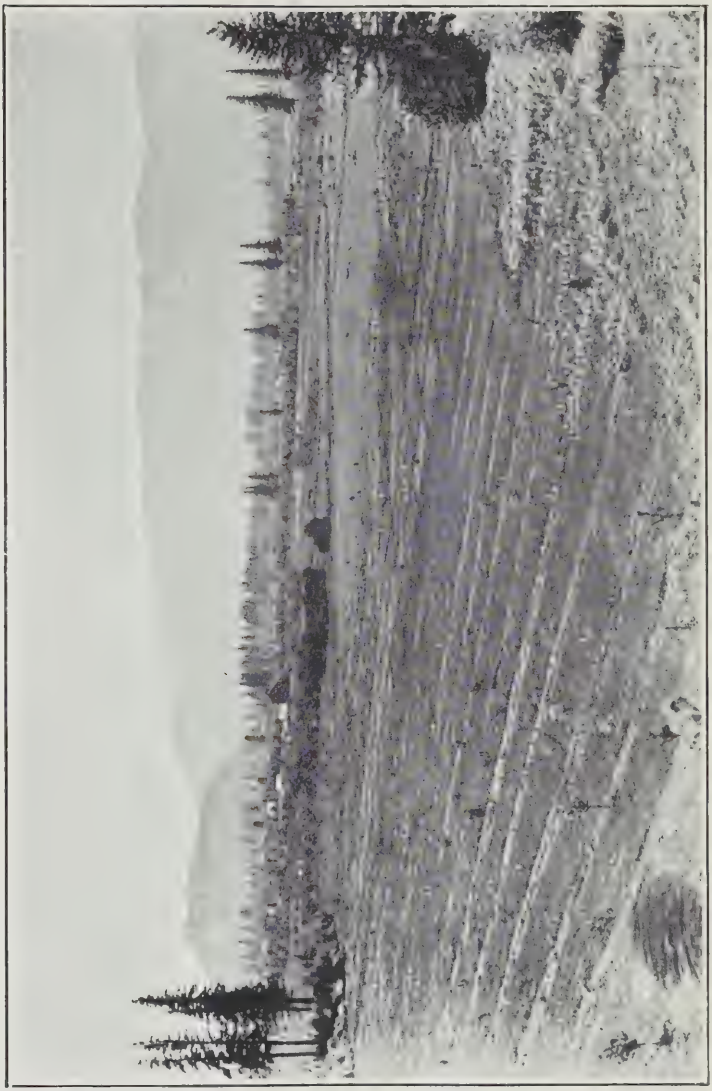
Most sorts of vegetables have been grown each year, generally with good returns. As yet, no greenhouse has been erected for starting the earlier and more tender varieties, hot beds being used for this purpose.

Cattle.

During the period from the establishment of the Farm until 1911, some work was done with a few of the dairy breeds of cattle and, in later years, considerable attention was paid to the development of a herd of milking Shorthorns.

It has recently been decided to go more extensively into the dairying feature of experimental work, and the Shorthorn herd above referred to was replaced, in December, 1911, by one of grade Holstein-Friesians from Eastern Ontario. The herd brought here consisted of 28 head of females of different ages and grades, and were headed by a pure-bred bull of strong milking strain. An effort is being made to form a herd of high-producing dairy cattle from grade stock and to demonstrate what can be done in turning out first-class dairy products at a profit. Feeding experiments wi l also be made with these cattle.

This change has necessitated the erection of several buildings. A new dairy barn has been built, in which an attempt has been made to combine cheapness and utility with sanitary conditions, light and air. The stable is made to hold forty cows and has concrete floors and iron fittings throughout. It is 86 feet by 39 feet, with 9 foot ceiling, and has a feed and mixing room 22 feet by 25 feet, to which the two silos are joined. The latter are of wood, eighteen and fifteen feet in



A young Orchard, Agassiz,

diameter respectively and thirty feet high Per cow, there is about ten square feet of glass and 750 cubic feet of air space.

The old stable has been remodelled and a cement floor put in. The part intended for horses is made to hold eleven, and that for cows contains four large calf pens, two box stalls for cows and one bull pen.

A dairy, twenty by twenty-eight feet, has just been completed, and is equipped to turn out either butter or fancy cheese.

Horses.

These have been kept, so far, only to carry on the farm work, nothing having been done in horse breeding, which, however, will be given attention from now on, with the object of producing animals suitable for farm use.

Sheep.

For a number of years a fair-sized flock of Dorset Horned sheep has been maintained on the Experimental Farm. The flock is a good one, although it has not been bred for show purposes, the breed is well suited to the climate and gives little or no trouble with disease or the ailments peculiar to the race. They are noted for their fecundity and frequently produce twins, which they nourish well.

Swine.

The swine on the Farm have been kept chiefly for the supply of pure-bred stock to people in the out-lying districts of the Province, rather than for experimental feeding purposes. The demand for young stock has been very great, much exceeding the supply. Two breeds are kept, the Improved Yorkshire and the Berkshire.

As the by-products of the dairy herd increase, this branch of live stock work will be entered into more extensively, greater attention being paid to breeding and experimental feeding work and to other problems connected with the industry.

Pasture and soiling work in this connection is being commenced and a new and more up-to-date piggery is contemplated.

Poultry.

About two acres of land, part of which is well shaded with a nut plantation, has been permanently fenced with six-foot wire netting, with one strand of plain wire on top. In this enclosure, three poultry houses of different styles have been built. Each of these is twenty by fourteen feet and represents

the "Ottawa Cotton Front," the "Woods" and the "Tolman" style of house, respectively.

The breeds kept at present are the S. C. White Leghorn, Barred Plymouth Rock, Rhode Island Red, Black Minorca, Buff Orpington and White Wyandotte.

Experimental work in feeding, breeding, fattening, styles of houses, and nests, including trap nesting, is being carried on. Experiments in artificial hatching are also tried from time to time.

While the work with poultry is being started in only a small way, it is hoped to increase its scope rapidly, owing to the prominent part it holds in agriculture in British Columbia and to supply the great demand for breeding stock. As there is no other experimental poultry plant in the province, a great deal of interest is being shown in this department of the work of the Agassiz Farm.

The increase in number of the live stock kept and the change in the system of farming pursued, will permit of more attention being paid and a greater area devoted to the study of problems relating to rotations and cultural methods. Work in the former has been already commenced.

Crops Grown on the Sections Indicated on the Map of the Experimental Farm at Agassiz, B.C.

Section No. 1.

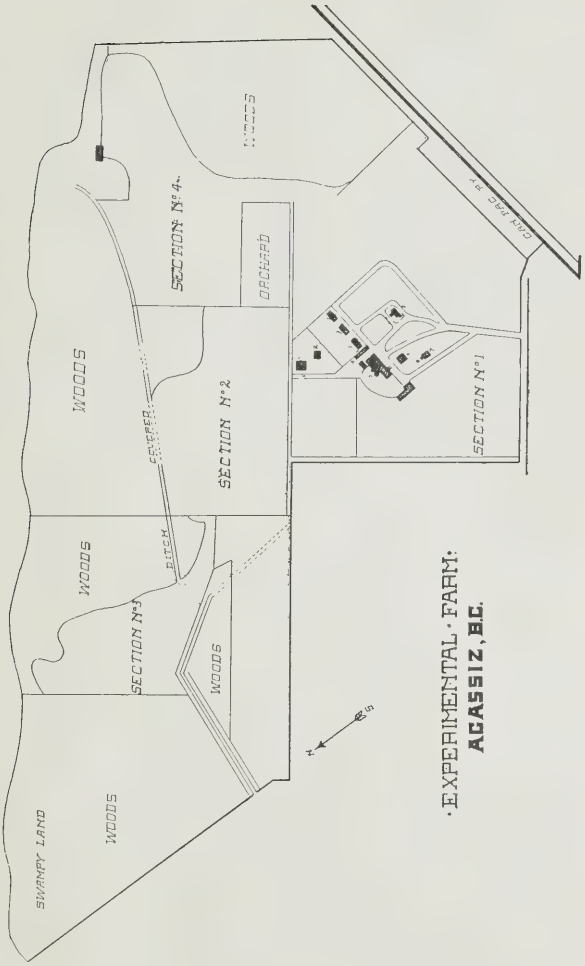
1st year.—Hoed crops. 1911.
1912.—Grain.
1913.—Hay.
1914.—Pasture.

Section No. 2.

1911.—Grain.
1912.—Hay.
1913.—Pasture.
1914.—Hoed crops.

Section No. 3.

1911.—Pasture.
1912.—Hoed crops.
1913.—Grain.
1914.—Hay.


WOODS
SECTION N° 4.
WOODS
ORCHARD
OAK TREE AV.
SECTION N° 2
SECTION N° 1
WOODS
SECTION N° 3
WOODS
SWAMPY LAND
WOODS
EXPERIMENTAL FARM
AGASSIZ, B.C.

Section No. 4.

1911.—Hay.
1912.—Pasture.
1913.—Hoed crops.
1914.—Grain.

Buildings as Numbered on Plan.

1—Hospital.
2—Laboratory.
3—Poultry houses.
4—Shed.
5—Stables and barns.
6—Dairy.
7—Cottage.
8—Superintendent's residence